



**U.S. Department of the Interior
Bureau of Land Management**

Buffalo Field Office

November 1999



Wyodak Coal Bed Methane Project Environmental Impact Statement RECORD OF DECISION





United States Department of the Interior

BUREAU OF LAND MANAGEMENT

Wyoming State Office
P.O. Box 1828
Cheyenne, Wyoming 82003-1828

In Reply Refer To:

1793 (930)

NOV 17 1999

Dear Reader:

Attached is the Record of Decision (ROD) for the Wyodak Coal Bed Methane Project. The ROD outlines the decision and rationale for the project. The decision incorporates restrictions and mitigation measures in response to comments received from Federal, State, and local Governmental agencies, and from the public on both the draft and final Environmental Impact Statements (EISs). This decision is subject to appeal as explained in the ROD under "Appeal."

The draft EIS on this project was issued in May of 1999 and the final EIS was issued in October of 1999. Twelve comment letters were received on the final EIS. None of the comments included new or substantive information that required revision of the EIS. The issues raised in the letters are summarized and responded to in the ROD. All comments received were taken into consideration in reaching our decision.

We appreciate the individuals, organizations, and the Federal, State, and local Governmental agency officials who participated in the environmental analysis process. Your involvement has enhanced the integrity of the EIS and our ability to make an informed decision.

Sincerely,

Alan R. Pierson
State Director

Attachment

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LIST OF ACRONYMS/ABBREVIATIONS

ac-ft/yr	Acre-feet per year
APD	Application for permit to drill
AQD	Air Quality Division, Wyoming Department of Environmental Quality
BA	Biological Assessment
BACT	Best Available Control Technology
BFO	Buffalo Field Office, Bureau of Land Management
BLM	Bureau of Land Management, U.S. Department of the Interior
CBM	Coal bed methane
CEQ	Council on Environmental Quality
CFR	Code of Federal Regulations. Numbers refer to title and part; that is, 40 CFR 1500 refers to title 40, part 1500.
cfs	Cubic feet per second (equivalent to 448.83 gallons per minute)
CO	Carbon Monoxide
COE	U.S. Army Corps of Engineers
COI	Circle of influence surrounding a CBM production well
EA	Environmental assessment
EIS	Environmental impact statement
EPA	U.S. Environmental Protection Agency
FS	U.S. Forest Service, U.S. Department of Agriculture
gpm	Gallons per minute (equivalent to 0.002 cfs, approximately)
GAGMO	Gillette Area Groundwater Monitoring Organization (coal operators)
HP	Horsepower
LQD	Land Quality Division, Wyoming Department of Environmental Quality

LRMP	Land and Resource Management Plan
mcf	Thousand cubic feet
MCFD	One thousand cubic feet per day
mg/l	Milligrams per liter (1 mg = 1 ppm [part per million]; 1 liter = 0.264 gallons)
mgd	Million gallons per day
µg/l	Micrograms per liter (1 µg = one thousandth of a milligram or 0.001 mg or 1ppb [part per billion])
µg/m³	Micrograms per cubic meter (1 cubic meter = 1.308 cubic yards)
mmhos/cm	Soluble salts (salinity) in a soil expressed in millimhos per centimeter
MMCFD	One million cubic feet per day
MT	Montana
NEPA	National Environmental Policy Act of 1969
NO_x	Nitrogen Oxides
NOI	Notice of Intent (to prepare an EIS)
NPDES	National Pollution Discharge Elimination System
pci/l	Picocurie per liter, used to measure Radium 226
pH	Acidity, measured in standard units
POD	Plan of Development
PM₁₀	Particulate matter less than 10 micrometers (respirable)
PRAGMO	Powder River Area Groundwater Monitoring Organization
PRB	Powder River Basin
psi	Pounds per square inch
R__W	Range <u>number</u> West, an east-west rectangular land survey area coordinate
RMP	Resource Management Plan

ROD	Record of Decision
S__	Section <u>number</u> , a rectangular land survey area
SO₂	Sulfur dioxide
Sq mi	Square miles
T__N	Township <u>number</u> North, a north-south rectangular land survey area coordinate
TBNG	Thunder Basin National Grassland
TDS	Total dissolved solids
TPH	Total petroleum hydrocarbons
TSP	Total suspended particulates
TSS	Total suspended sediments
µmhos/cm	Micromhos per centimeter (thousandths of unit of specific conductance, a measure of electrical conductivity)
USDA	U.S. Department of Agriculture
USDI	U.S. Department of the Interior
USFWS	U.S. Fish and Wildlife Service, U.S. Department of the Interior
USGS	Geological Survey, United States Department of the Interior
VOCs	Volatile Organic Compounds
VRM	Visual resource management
WDEQ	Wyoming Department of Environmental Quality
WOGCC	Wyoming Oil and Gas Conservation Commission
WQD	Water Quality Division, Wyoming Department of Environmental Quality
WSEO	Wyoming State Engineer's Office
WY	Wyoming

**BUREAU OF LAND MANAGEMENT
Buffalo Field Office**

**RECORD OF DECISION
for
WYODAK COAL BED METHANE PROJECT
CAMPBELL, CONVERSE, JOHNSON, AND SHERIDAN COUNTIES, WYOMING
ENVIRONMENTAL IMPACT STATEMENT**

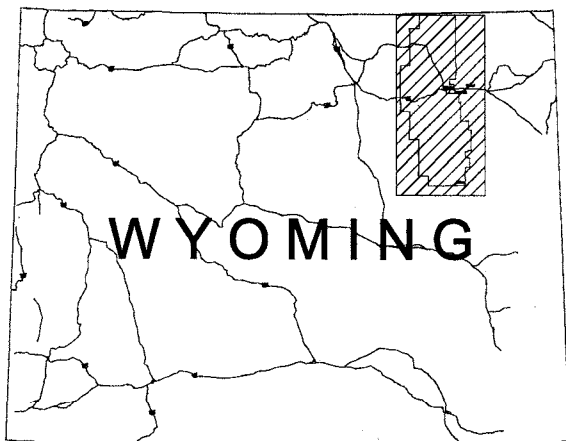
INTRODUCTION

This document records the decision made by the Bureau of Land Management (BLM) for managing coal bed methane (CBM) development of the public land surface and federal mineral estate in the Wyodak Coal Bed Methane project area within the eastern Powder River Basin (PRB), Wyoming. The project area for the selected alternative (Alternative 1) is located in Campbell, Converse, Johnson, and Sheridan counties within Townships 40-58 North, Ranges 70-77 West, 6th Principal Meridian. The project area encompasses approximately 3,600 square miles of mixed federal, state, and private lands (**Figure 1**).

The majority of private- and state-owned CBM resources within the project area will be developed regardless of the outcome of this environmental impact statement (EIS), but under Alternative 1 the project will include production from private, state, and federal CBM properties. It is significant to note that although approximately 9.3 percent of the project area consists of BLM-administered federal surface, federal oil and gas ownership constitutes about 56 percent of the project area.

Drilling and development operations for CBM wells located on lands where mineral rights are owned and controlled by the federal government must be conducted under an application for permit to drill (APD) and plan of development (POD) approved by the BLM. In considering whether to approve APDs and PODs, the BLM must consider the possible project-specific and cumulative environmental impacts to ensure compliance with the National Environmental Policy Act of 1969 (NEPA). The Wyodak EIS was prepared to meet that requirement for CBM wells within the project area. An additional analysis, which will look at the site-specific impacts of identified drilling locations and their relationship to the range of impacts documented in this analysis, will be completed in response to the filing of an APD/POD and prior to approval by BLM.

The BLM's authority and decisions related to CBM development in the eastern PRB are limited to the agency's stewardship, resource conservation, and surface protection responsibilities for federal lands and minerals. As conservator of the federal surface and mineral estate, the BLM has responsibility for ensuring that the federal mineral resource is conserved (not wasted) and is



Project Area



0 12 24
Scale (miles)

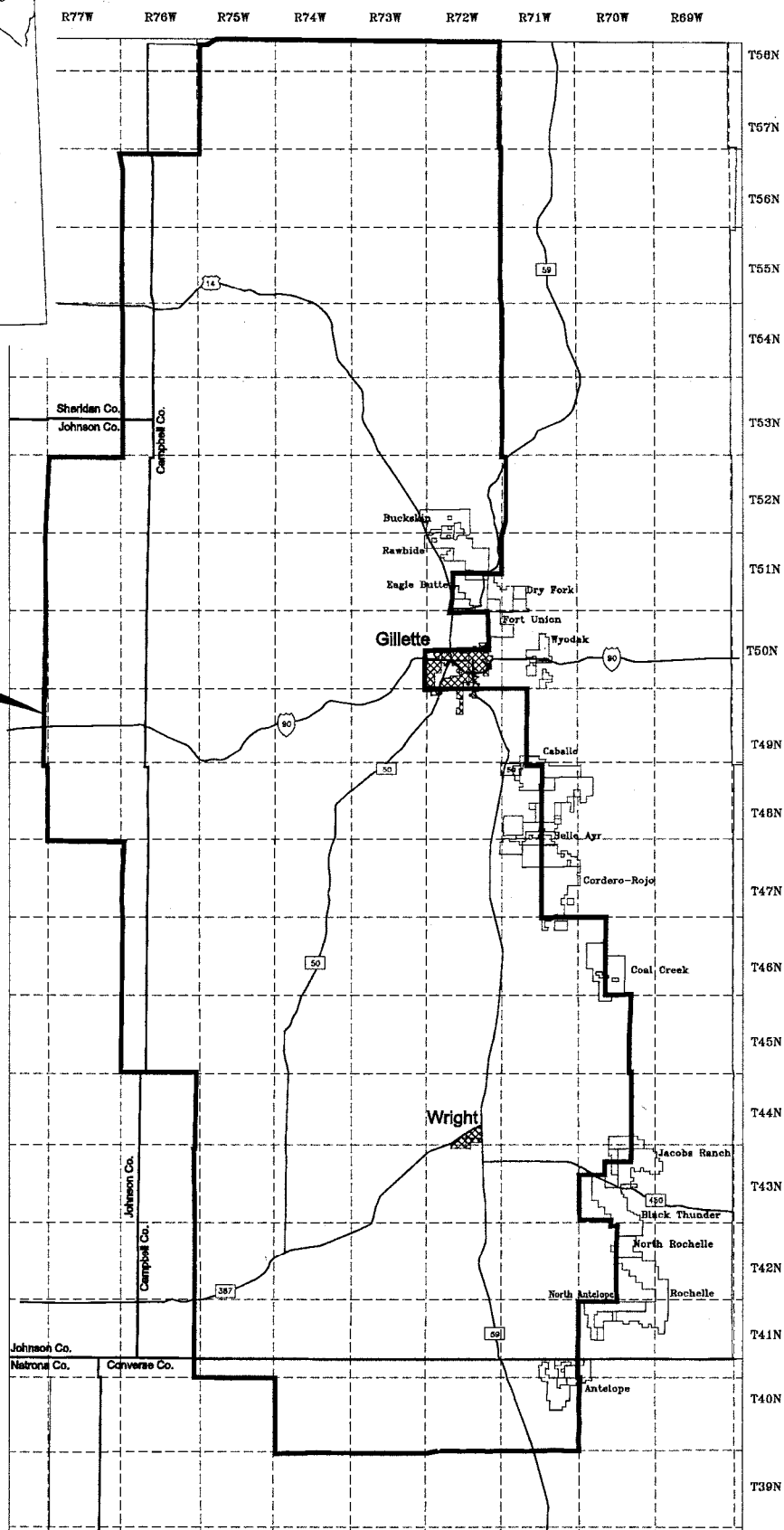


Figure 1
Wyodak CBM Project
General Location Map

developed in a safe and environmentally sound manner. However, the BLM does not authorize or control any of the following:

- CBM development involving only fee or state-owned lands and minerals;
- the appropriation (withdrawal) or subsequent beneficial use of groundwater;
- water quality;
- the discharge of CBM produced water to surface waters;
- surface water diversions, stream channel modifications, construction of new reservoirs, reservoir supply, or dam modifications to existing reservoirs on private or state surface; or
- air quality, including siting, permitting, emissions, and monitoring for stationary or mobile sources of air pollution and regional haze.

Regulatory areas where the BLM has shared responsibilities with other federal or state agencies include the following:

- oil and gas well spacing (BLM concurs with the WOGCC);
- oil and gas drilling;
- activities that would impact waters of the U.S.;
- special status species of plants or animals; and
- cultural, historical, or paleontological resources.

The agency works in close collaboration with agencies and others having varied regulatory and resource management responsibilities associated with CBM development in the eastern PRB. The agency neither defers its responsibilities nor takes over the authorities or responsibilities of other entities.

When actual locations and operational requirements for CBM gas compression facilities are determined, permit applications will be submitted to the Air Quality Division (AQD) of the Wyoming Department of Environmental Quality (WDEQ). At that time, additional site-specific air quality analyses, such as a Best Available Control Technology (BACT) analysis or Prevention of Significant Deterioration (PSD) increment analysis, may be performed. The analysis contained in the Wyodak CBM Project EIS is not intended as an air quality regulatory determination. PSD increments are used here only to evaluate air quality impacts.

The air quality impact analysis for the Wyodak CBM Project EIS was concluded in May 1999 with the issuance of the DEIS. New information that has become available since then was outside the scope of the analysis protocol developed for the Wyodak CBM Project by the Wyodak Air Quality Advisory Committee. This new information was not used to modify the Wyodak analysis as the new information did not change the CBM impact analysis. New information will be used in future BLM documents analyzing air quality and air quality related values. Additional air quality modeling is planned to improve the accuracy of cumulative air quality impact predictions in the PRB. The results of any future air quality modeling will be included in future coal leasing and coal bed methane analyses as they become available.

AUTHORIZING ACTIONS

The BLM's Buffalo Field Office (BFO) administers oil and gas leases for all federally-owned CBM within the project area. CBM development is regulated in accordance with federal oil and gas regulations and onshore oil and gas orders. The U.S. Supreme Court recently decided the ownership of CBM in *Southern Ute Indian Tribe vs. Amoco Production Company et al.*, a case involving CBM development in Colorado. CBM is disposable under the oil and gas leasing provisions of the 1920 Mineral Leasing Act.

Leasing of federal lands and federal minerals administered by the BLM is subject to the limitations imposed by the *Buffalo Resource Management Plan/Record of Decision* (RMP) (USDI BLM, 1985 as amended or maintained); current policy; and local, state, and federal laws. The FS's Douglas Ranger District of the Medicine Bow-Routt National Forest administers oil and gas leasing and development activities within the Thunder Basin National Grassland (TBNG). Leasing and development activities on FS-administered federal lands are subject to the limitations imposed by the *Land and Resource Management Plan for the Medicine Bow National Forest and Thunder Basin National Grassland* (LRMP) (USDA FS, 1985 as amended) and the EIS for *Oil and Gas Leasing on the TBNG* (USDA FS, 1994).

Before any surface disturbance can occur on federal lands and/or federal minerals administered by the BLM, a company must have an APD approved by the BLM Field Manager for on-lease drilling. A right-of-way must be approved by the BLM for off-lease disturbance of federal surface. Securing necessary legal access to and/or across any state- or privately-owned lands also is part of the APD approval process. The Wyoming Office of State Lands and Investments is responsible for easements and temporary uses of state lands that are required for off-lease activities. Before any surface disturbance can occur on FS-administered federal lands, a company must have a surface use plan approved by the FS District Ranger for on-lease activities, which is part of the APD that must be approved by the BLM Field Manager. A special-use permit is issued by the FS to manage off-lease activities on FS-administered federal lands. On-lease production facilities on federal lands and/or federal minerals are authorized by Sundry Notices.

The Wyoming Oil and Gas Conservation Commission (WOGCC) regulates drilling and well spacing, and requires an approved APD for all oil and gas wells drilled in the state, including federal wells. The WOGCC also regulates reserve pits and water encountered (surface flows) or produced during drilling operations. BLM responsibilities involving conservation and efficient production of federal oil and gas resources are met through well spacing requirements set by the WOGCC. The BLM concurs with the well spacing requirements set by the WOGCC.

Under current State of Wyoming laws, CBM operators are allowed to produce water with a stock/miscellaneous use WSEO permit and discharge that water with an NPDES permit from WDEQ. Producers operating with these permits are within the requirements of state laws.

The State of Wyoming considers water produced in conjunction with CBM development to be a beneficial use of groundwater and requires an approved permit from the Wyoming State Engineer's

Office (WSEO) prior to the drilling of a CBM well. This WSEO permit authorizes the appropriation of groundwater from subsurface aquifers and its subsequent beneficial use at specific locations. Surface water diversion, stream channel modification, reservoir supply, construction of new reservoirs, and/or dam modification on existing reservoirs also require permits from the WSEO. Engineering designs are required, as appropriate, as part of the approval process.

The Water Quality Division (WQD) of the WDEQ regulates increasing sedimentation, erosion, and other issues affecting the quality of water. WQD also is responsible for granting a National Pollution Discharge Elimination System (NPDES) permit for surface discharge of produced waters from CBM wells. The WDEQ's NPDES permitting process, effluent limitations, and monitoring requirements for CBM produced water currently are being reevaluated. Specific requirements for discharge of CBM produced waters are being evaluated on a case-by-case basis.

The WQD also issues NPDES permits for pipeline construction activities that disturb five or more acres or involve temporary discharge to "Waters of the State" during hydrostatic testing. Beginning no later than 5/31/2002, construction projects that clear one acre or more will be required to obtain stormwater permit coverage. Types of oil and gas activities that may be covered include well pad construction, road construction, pipeline installation, and any other activity that results in clearing, grubbing, or grading of the land surface.

The WQD also administers a voluntary State Wetland Bank where landowners can temporarily "bank" newly-created wetlands as a wetlands credit. The existence of a non-wetland use is recorded to facilitate reversal of the decision creating the banked wetlands (if desired, as long as the wetland credit was not used as mitigation for another wetland impact). Where the U.S. Army Corps of Engineers (COE) exerts federal jurisdiction over banked wetlands, the outcome of decisions involving these wetlands will be in accordance with the federal regulations administered by the COE.

Federal agencies are directed to take action to minimize the destruction, loss, or degradation of wetlands, and to preserve and enhance the natural and beneficial value of wetlands by Executive Order (EO) 11990, May 24, 1977, (Protection of Wetlands). A BLM instructional memorandum summarizing the operating procedures used to implement this federal policy for all Wyoming wetlands administered by the BLM is included in Appendix A of the DEIS.

The COE authorizes activities that would impact navigable waters and waters of the U.S. through individual permits or nationwide permits for categories of activities, and also receives pre-construction notification of activities. "Waters of the U.S." is a collective term for all areas subject to regulation by the COE under Section 404 of the Clean Water Act. COE will require a permit when dredge or fill activities are planned in waters of the United States. The COE currently is in the process of developing a Programmatic General Permit (PGP) for oil and gas exploration and development activities in Wyoming having minor environmental impacts. A February 19, 1998 letter describing COE jurisdictional areas, regulated activities, and permitting requirements in relation to CBM production activities in northeastern Wyoming is included in Appendix A of the DEIS.

The AQD of the WDEQ enforces U.S. and Wyoming Air Quality Standards and Regulations, and authorizes the construction and operation of stationary compression facilities. A Section 21 permit application is required prior to the construction, modification, or operation of any site, equipment, source, facility, or process that may cause or increase the emissions of an air contaminant into the atmosphere. Emissions from all stationary sources and monitoring activities for these sources are regulated by the WDEQ. The WDEQ has the authority to set permit limits, mitigating measures, monitoring requirements, and BACT for stationary sources.

The EPA has the authority to set permit limits, mitigating measures, monitoring requirements, and maximum allowable emission rates for mobile sources (including coal trains). New federal regulations on regional haze require reductions in haze over time.

Construction within the City of Gillette, use of existing rights-of-way and easements dedicated or owned by the City, or discharge of water within the city limits into the City's storm drainage system would require permits. Additionally, the City of Gillette has noise ordinances that could affect drilling or construction within the jurisdiction. Similar permits likely would be required for the proposed project from the affected counties or the City of Wright.

As part of the APD approval process for oil and gas drilling on federal lands and/or federal minerals it administers, the BLM reviews the surface use and drilling plans submitted by a company. For CBM development, BLM is asking operators to submit a Project Plan of Development (POD), which includes a master drilling plan, a master surface use plan for all wells, and a water management plan. Each POD includes up to 32 wells.

After the BLM receives a Notice of Staking (NOS) or an APD/POD and before approval, an onsite inspection is made of the proposed drilling locations, access roads, water management, and potentially-disturbed areas. BLM personnel, company representatives, and the surface owner(s) usually attend the inspection to determine site-specific conditions for approving the APD/POD. As part of the APD/POD approval process, BLM requires standard and, in some cases, special site-specific protective measures for design and operation of the proposed project and may require establishment of additional monitoring wells.

Before construction, the Companies are required to follow current BLM land management guidance and decisions, and comply with existing laws for threatened and endangered species; cultural, historical, and paleontological resources; and federally-protected raptor nests. The actions proposed must be in conformance with the BLM's Buffalo RMP (USDI BLM, 1985 as amended or maintained) and the BLM's oil and gas maintenance action (10/11/1990). The BLM applies any appropriate conditions of approval to mitigate impacts and protect site-specific resources. A plan for monitoring and mitigating potential adverse impacts to groundwater and surface water is a required part of this project design. This plan is compiled in Chapter 2 of the FEIS and beginning on page 28 of this ROD. Standard *Conditions of Approval* for APDs used by BLM's Buffalo Field Office as the starting point for a mitigation plan are contained in **Appendix A** of this Record of Decision (ROD). Mitigating measures that would be considered during project design are compiled in Chapter 2 of the FEIS, and beginning on page 39 of this ROD.

As part of the APD approval process for FS-administered federal lands, the FS reviews the surface use plan and BLM reviews the drilling plan submitted by a company. After the FS and BLM receive the NOS or APD and before approval, an onsite inspection is made of the proposed drilling locations, access roads, and other potentially-disturbed areas. Agency personnel and company representatives attend the inspection to determine site-specific conditions for approving the APD. As part of the APD approval process, the FS and BLM require standard and, in some cases, special site-specific protective measures for design and operation of the proposed project, and the FS may require additional baseline information on water resources or the establishment of additional monitoring wells.

Before construction, the Companies would be required to follow FS land management guidance and comply with existing laws. The actions proposed within the project area must be in conformance with the management goals within the FS LRMP (USDA FS, 1985 as amended). The management goal for the TBNG is to demonstrate grassland management and utilization of resources and values that are in harmony with nature's requirements and behavior, and to foster long-term economic stability and productivity of the land base and quality of life for the people and communities in the area. The TBNG is managed to provide for multiple land uses, including oil and gas development; a broad spectrum of dispersed recreation opportunities; characteristic landscapes that satisfy the adopted visual quality objectives; increased public access; wildlife and fish habitats that maintain viable populations; and water quality and increased water quantity where possible (USDA FS, 1985, as amended).

All of the TBNG is available for oil and gas leasing. Many leasing restrictions were developed by the FS in 1994 for use within the TBNG. Any restrictions applicable to drilling or production activities may be included as conditions of approval for activities on post-1994 leases. These restrictions can be reviewed to provide insight regarding conditions of approval that may be applied to future APDs within the TBNG (USDA FS, 1994). The FS would apply any appropriate conditions of approval to APDs that are needed to protect site-specific resources or conditions.

DECISION

The BLM approves Alternative 1 for the development and production of coal bed methane on public lands and minerals the agency administers. The decision approving Alternative 1 is supported by the State of Wyoming. This decision recognizes that there are other important natural resources and values within the area that require consideration and protection from unnecessary or undue degradation. Based on the environmental analysis of the Proposed Action and alternatives documented in the *Wyodak Coal Bed Methane Project Draft Environmental Impact Statement* (DEIS), May 1999, and the *Wyodak Coal Bed Methane Project Final Environmental Impact Statement* (FEIS), October 1999, the BLM's decision incorporates restrictions and mitigation measures in consideration of federal, state, and local agencies, and public comments received on both the DEIS and FEIS. The decision allows the development of coal bed methane to meet public needs, while providing maximum consideration for protection of the natural environment, resulting in the least amount of irretrievable commitment of the natural resources and resource values.

Oil and gas exploration and development are authorized in accordance with a staged decision-making process mandated by federal law. Each decision is based on environmental analysis and disclosure of the probable effects in accordance with NEPA.

This decision to approve Alternative 1 authorizes Field Managers to proceed with the APD/POD level of analysis and site-specific (project-level) decision-making. The APD/POD environmental analyses will be tiered to the Wyodak CBM Project EIS. The decision made in this ROD does not authorize ground-disturbing activities. Those activities will be analyzed site-specifically in accordance with NEPA, during the APD/POD analyses that will implement the Wyodak CBM Project EIS.

This decision applies only to the federal mineral estate subject to administration by the BLM. All activities during the development, operation and production, and abandonment phases of the project will be conducted in compliance with all applicable federal, state, and county laws, regulations, and stipulations. This decision is based on the EIS completed for the proposal (Wyodak CBM Project). The EIS is guided by the BLM's *Buffalo Resource Area Resource Management Plan* (RMP) (USDI BLM, 1985 as amended or maintained), which describes the planning decisions for public land management within the Buffalo Resource Area. Comments received during the initial scoping period, the 45-day comment period for the DEIS, and the 30-day comment period for the FEIS were taken into consideration.

The environmentally preferred alternative for the Wyodak Coal Bed Methane Project is Alternative 1. The BLM believes that Alternative 1 complies with the National Environmental Policy Act's (NEPA) Section 101. Alternative 1: (1) best meets the BLM statutory mission under the Mineral Leasing Act and the Federal Land Policy and Management Act; (2) identifies required mitigation which includes all reasonable and practicable means to avoid or minimize environmental harm from the proposed development; (3) includes a monitoring program to ensure implementation and maintenance of necessary mitigation; (4) includes a requirement for operators to offer all affected landowners the water well agreement developed by the landowners and operators; and, (5) requires operators to develop a network of monitoring wells for the BLM and the Wyoming State Engineer.

Approval of Alternative 1 and individual project components are subject to the administrative requirements and conditions of approval described in the draft and final EISs. Standard "Conditions of Approval" for APDs used by the BLM's Buffalo Field Office are contained in **Appendix A**.

Approval of Alternative 1 and individual project components are conditioned upon and subject to the following pre-authorization administrative requirement: before any permit is issued authorizing an action on public lands (for example, application for permit to drill, sundry notice, or right-of-way), the final location for each well site, access road, pipeline, or other facility will be evaluated site-specifically through an environmental analysis, in accordance with the BLM's NEPA Handbook (H-1790-1). Each site-specific plan of development (POD) analysis will be documented in an environmental assessment (EA) that will consider the water management plan, including all proposed and potential CBM wells (for all operators) that likely would be discharged within each drainage (watershed) included in the POD. The reasonably foreseeable development scenario,

mitigation plans, and monitoring activities for all operators within each drainage (watershed) will be refined over time in EAs completed for PODs. CBM development activities will be tracked as GIS data themes that will be updated continuously. Conditions of approval for APDs will be modified, as needed, in response to applicable NEPA decision records. The cumulative impacts of specific development activities on wildlife habitat, and migratory birds associated with well sites, roads, pipelines, impoundments, and increased human activity, will be considered when establishing conditions of approval for APDs on federal lands. EAs will document whether adjacent habitats are available for those species that would be displaced by the proposed activities.

A biological assessment addressing potential project impacts on black-footed ferrets (*Mustela nigripes*), Ute ladies'-tresses (*Spiranthes diluvialis*), mountain plover (*Charadrius montanus*), and the bald eagle (*Haliaeetus leucocephalus*), is available for review at the Buffalo Field Office of the BLM in Buffalo, Wyoming. The biological assessment, which has been submitted to the USFWS, provides the basis for determining the nature of continuing consultation and surveys that will be necessary for proposed plans of development, in accordance with Section 7(c) of the Endangered Species Act of 1973, as amended.

The DEIS, FEIS, and comment letters received on the FEIS may be reviewed by contacting the Field Manager, Buffalo Field Office at the following address: BLM Field Manager, Buffalo Field Office, 1425 Fort Street, Buffalo, Wyoming 82834. A limited number of copies of the DEIS and FEIS are available for distribution beyond those provided to parties on the DEIS and FEIS mailing lists.

APPROVED PROJECT (ALTERNATIVE 1)

Plans for the development of CBM resources within the PRB have been expanding since the Proposed Action and alternatives were developed in 1998. The Approved Project represents only a portion (initial stage) of the CBM development that is anticipated within the PRB. Development of non-federal CBM resources (outside the scope of this EIS) is occurring more rapidly than has been anticipated in this EIS. As of November 1, 1999, 3,041 CBM wells already had been drilled or spudded (WOGCC, 1999b).

Summary

The Approved Project (Alternative 1) consists of drilling, completing, operating, and reclaiming approximately 5,000 new productive CBM wells and related production facilities. The fee and state wells included in the Approved Project are connected actions to the proposed federal wells. The project area is located in the eastern PRB within Campbell County and small portions of Converse, Johnson, and Sheridan Counties, Wyoming (**Figure 1**). Alternative 1 was developed by the BLM in response to expressions of interest in CBM development within additional townships outside the Proposed Action project area.

Development of natural gas (coal bed methane) wells and related facilities associated with the Wyodak CBM Project are included in the Approved Project. Proposed CBM development is based on an assumed 40-acre well spacing pattern. CBM development could occur in accordance with

other spacing patterns involving similar anticipated impacts. The authority to set or change well spacing is exercised by the WOGCC and BLM concurs with this spacing. The exact well locations will be determined subsequent to this EIS during the environmental analysis conducted for each well's APD/POD, which will be reviewed and approved on a case-by-case basis. The APD/POD review process allows conditions of approval to be developed for each well or POD on the basis of site-specific water monitoring requirements and environmental constraints. In addition to well sites, other facilities, such as access roads, gas gathering and water disposal pipelines, electrical utilities, and compressors, will be developed to facilitate natural gas production in the well fields.

Coal bed methane is owned by the federal government over approximately 50 percent of the project area. For the purpose of this analysis, the following conditions were assumed: One-half of the 5,000 new productive wells are estimated to be federal wells; most drilling activity will occur during an initial development period of five years; and the actual rate of development will depend on the productivity of the wells and the ability to compress and market the methane. Currently, interest in immediate CBM development is high. More than 60 companies filed APDs with the WOGCC through August 1999, for CBM well locations on federal, state, and private lands within the PRB (WOGCC, 1999b).

In addition to the proposed new wells, the Approved Project also includes increased rates of development, CBM production, and surface water discharge and an increased area of disturbance within areas previously analyzed in the Gillette North CBM Project EA and the Gillette South CBM Project EIS (Map 1-1 of the FEIS). Both the Gillette North CBM Project EA and Gillette South CBM Project EIS assessment areas are contained within the project area boundary for the Wyodak CBM Project EIS.

The CBM wells included in the Approved Project will be located in Wyoming, within a long rectangular area extending up to 110 miles in a north-south direction from the Wyoming-Montana border, and covering nearly 40 miles in an east-west direction at some locations (**Figure 1**). The eastern extent is defined by the areas of major coal development in eastern Campbell County. Gillette is located adjacent to the eastern boundary of the project area, just outside the area's eastern limit. Wright is located in the southern portion of the project area. Wyoming Highway 59 passes through the project area, connecting Interstate 90 at Gillette with Interstate 25 near Douglas.

As stated under the "Location of the Proposed Action" in Chapter 1 of the FEIS, the project boundary was delineated by industry interest, but there is no legal requirement for companies to confine drilling to this area, other than the location of their federal leases. The Approved Project will include well development and production from private, state, and federal properties.

The area analyzed under the Alternative 1 (Approved Project) totals approximately 3,600 square miles (2,317,000 acres). Well spacing, combined with a preferred approach to locating wells, results in grouping of most wells into "pods" of about ten wells or more, depending on the structure of the coal seam. Developed areas may have up to 16 wells per square mile based on an assumed 40-acre spacing. Development typically will result in wells drilled within productive portions of the project area on a spacing determined by the WOGCC. The remaining less productive portions of the project

area, where initial wells do not yield sufficient quantities of CBM, may never have any subsequent activity. The average density of new wells, if all 5,000 productive wells were drilled, will be approximately 1.4 wells per square mile. Refer to **Table 1** for additional information.

The BLM has a general policy that requires access roads to oil and gas wells on federal lands to be crowned, ditched, and, in most cases, graveled or otherwise surfaced. The BLM's general policy is based on the typical requirements for multi-component drill rigs. For CBM development, an exception has been made to this policy in consideration of the following factors. A shallow well drilling rig will be used for both drilling and completion activities. This type of drill rig and the well servicing equipment that supports its operation are modest in size, when compared with multi-component drill rigs and equipment used to drill deeper conventional oil and gas wells. Each CBM well will be drilled within an estimated one to three days. Well completion also will occur within an estimated one to three days. Typically, well pads will not be leveled unless steep terrain cannot be avoided. For producing CBM wells, on average, well service visits are expected to occur once a month. As a result, two-track unimproved roads or trails will be used for access to the majority of CBM wells. In some cases, roads will need to be upgraded to the BLM's minimum standards due to special conditions such as rough topography or stream drainage areas.

The project will develop over time as the Companies implement their various CBM projects. Drilling activity will be concentrated within an estimated five-year initial development period. A certain number of wells will be drilled and connected to pipelines each year within portions of the project area. Numerous companies may drill wells during the same given year. Actual well locations will be determined by the success of previous drilling, which determines where CBM can be produced economically. Lower numbers of wells being drilled could result from various economic factors that would cause companies to limit activity. A study conducted by the BLM projects an estimated average CBM well life of 12 years (USDI BLM, 1996).

Table 1 (continued) Proposed Coal Bed Methane Development Alternatives			
	Approved Project (Alternative 1)	Proposed Action	No Action
1. Proposed Project Area (estimated):	2,317,000 ac 3,600 sq mi	1,538,000 ac 2,400 sq mi	1,538,000 ac 2,400 sq mi
2. Wells (projected): New Productive CBM Wells (total): New Productive CBM Wells (federal oil & gas ownership) Maximum Well Density: Average Density (new wells only): Average Density (all CBM wells): Average Depth: Average Production Rate (per well):	5,000 2,500 16 wells/sq mi 1.4 wells/sq mi 1.6 wells/sq mi 350 to 1,200 ft 125 MCFD	3,000 1,500 16 wells/sq mi 1.3 wells/sq mi 1.6 wells/sq mi 350 to 1,200 ft 125 MCFD	2,000 0 16 wells/sq mi 0.8 wells/sq mi 1.2 wells/sq mi 350 to 1,200 ft 125 MCFD
3. Production Pods (estimated):	500	300	200
4. Water Discharge (estimated): Maximum Annual Volume (new wells)	96,800 ac-ft/yr	58,080 ac-ft/yr	38,720 ac-ft/yr
5. Compression Facilities: ^a Total Horsepower Rating (Field Gathering) Total Horsepower Rating (Pipeline Transport)	161,100 27,000	161,000 27,000	161,000 27,000
6. Transmission Pipeline Capacity (estimated): Available Pipeline Capacity (by the end of 1998): Redstone Western Gas Resources TOTAL Pipeline Capacity (life of project): Redstone Western Gas Resources Thunder Creek Misc. (wet gas line capacity for CBM gas) TOTAL	40 MMCFD 120 MMCFD 160 MMCFD 40 MMCFD 585 MMCFD 450 MMCFD 20 MMCFD 1,095 MMCFD	40 MMCFD 120 MMCFD 160 MMCFD 40 MMCFD 585 MMCFD 450 MMCFD 20 MMCFD 1,095 MMCFD	40 MMCFD 120 MMCFD 160 MMCFD 40 MMCFD 585 MMCFD 450 MMCFD 20 MMCFD 1,095 MMCFD

Table 1 (continued) Proposed Coal Bed Methane Development Alternatives			
	Approved Project (Alternative 1)	Proposed Action	No Action
7. Project Air Emissions^b NO _x (Nitrogen Oxides) Tons/Year Compression Facilities Project Vehicles CO (Carbon Monoxide) Tons/Year VOC (Volatile Organic Compounds) Tons/Year PM ₁₀ (Fugitive Dust) Tons/Year Project Vehicles Disturbed Areas	2806.7 18 4902.7 1641.8 11,224 956	2806.7 18 4902.7 1641.8 11,224 956	2806.7 18 4902.7 1641.8 11,224 956

^a Compression facilities were estimated based on logical initial field-wide development plans, and do not vary by alternative. Alternatives are based on differing well numbers considered in this analysis. Compression is designed to handle both the Proposed Action and Alternative 1 activity levels.

^b Only projected air emissions that were quantified as a part of the impact analysis for air quality and air quality-related values are included in this table.

Note:

Gas production is measured in cubic feet per day.

MCFD represents 1,000 cubic feet per day; MMCFD represents 1,000,000 (one million) cubic feet per day.

ac = acres; sq mi = square miles; ac-ft/yr = acre-feet per year (1 acre-foot = 325,829 gallons).

For the purposes of this analysis, the productive life of a CBM well is estimated to be 12 years. However, the cessation of groundwater pumping may not occur 12 years after a CBM well is drilled. If all wells in a given geographic area are not drilled at the same time, then groundwater may continue to be pumped from wells that are no longer producing commercial quantities of methane in order to continue efficient CBM production from nearby productive wells. Therefore, for the purposes of groundwater and surface water analysis only, the groundwater withdrawal and surface disposal of produced water are estimated to occur over 15 years (on average). The estimated productive life of the project is 12 to 17 years, as the first wells drilled would no longer be productive after 12 years. The last wells drilled during the five-year initial development period would no longer be productive after 17 years.

Based on the production characteristics from a composite of approximately 300 CBM production wells located within the project area (PI/Dwight's, 1998), water production is expected to average 12 gallons per minute (gpm) per well. This estimate of water production was compared to updated production characteristics from a composite of 638 CBM wells in the PRB, which average 10.4 gpm of produced water (PI/Dwight's, 1999) and to WOGCC production statistics for May 1999, covering 902 producing CBM wells within the WOGCC's "Wyodak EIS area", which average 12.4 gpm of produced water (WOGCC, 1999a). For the purposes of this analysis, water production is expected to average 12 gpm per well over the life of a well.

This value will vary within the project area and throughout the life of a well, with increased values occurring in the western portion of the area and at the beginning of a well's life. Water production, on average, is not expected to exceed an estimated of 0.05 ac-ft/day/well (17,280 gallons/day/well). As anticipated CBM development expands toward the western portions of the project area and deeper, thicker coal beds under greater pressures are developed, water production from newly completed CBM wells likely will increase, and exceed the average water production considered for this initial phase of CBM development. Water production may decrease with time. Produced water contains an average (mean value) of 764 mg/l Total Dissolved Solids (TDS) based on WDEQ discharge monitoring report data from 577 CBM effluent (discharge) samples taken within the project area and reported to WDEQ between 12/31/93 and 12/31/97 (WDEQ, 1998).

Approved Project Components

The Approved Project will consist of the following components proposed by any lessees or operators (operators), as defined in Onshore Order No. 1 issued under 43 CFR 3164:

- Approximately 5,000 additional productive CBM wells will be drilled. The maximum number of BLM approvals will be based on the number of wells and anticipated impacts analyzed in the Wyodak CBM Project EIS and the Buffalo RMP (as amended or maintained). The Approved Project includes the following facilities and infrastructure:

Production facilities, such as central delivery point or well pod buildings and meters;
Compression facilities having a total horsepower rating of 188,100 hp for field gathering and sales pipeline transport of CBM;

Transportation infrastructure, such as roads, pipelines, and utilities; and
Produced water discharge facilities authorized by the State of Wyoming and other agencies,
including discharge points authorized in NPDES permits.

- Potential short-term disturbance during drilling or installation of facilities, followed by reclamation, encompassing an estimated 15,763 acres;
- Potential long-term disturbance continuing during the productive life of the project, followed by reclamation, encompassing an estimated 10,788 acres;
- Projected (potential) air emissions continuing during the productive life of the project, totaling as follows:

Nitrogen Oxides (NO _x)	
Compression Facilities	2806.7 tons/year
Project Vehicles	18 tons/year
Carbon Monoxide (CO)	
	4902.7 tons/year
Volatile Organic Compounds (VOC)	
	1641.8 tons/year
Fugitive Dust (PM ₁₀)	
Project Vehicles	11,224 tons/year
Disturbed Areas	956 tons/year

- The requirement for CBM operators to form the Powder River Area Groundwater Monitoring Organization (PRAGMO) and provide common data compilation and monitoring results, as contained in the Record of Decision for the Gillette South CBM Project EIS, is hereby rescinded. The PRAGMO requirement is replaced with a requirement for CBM operators to drill and equip an independent monitoring network for the BLM and WSEO containing up to two well pairs or triples per township in the project area, and to conduct and report on specific groundwater monitoring activities (ROD, page 30). Proposed well locations are listed in the compliance and monitoring section of this ROD, beginning on page 33. This will allow the BLM and the WSEO to maintain an independent monitoring network that will provide a more accurate depiction of the actual drawdown that is occurring area-wide.

SUMMARY OF THE WYODAK CBM PROJECT PROPOSED ACTION AND ALTERNATIVES

Alternatives Analyzed in the EIS

Three alternatives were analyzed comparatively in the EIS: 1) the Proposed Action; 2) Alternative 1; and 3) the No Action Alternative. Alternative 1 considered more new federal and non-federal CBM wells (5,000 vs. 3,000), a larger project area (3,600 vs. 2,400 square miles), and a shorter initial development period (5 years vs. 7.5 years, estimated) than the Proposed Action. In other respects, including the application of mitigating measures for environmental protection, these two Alternatives did not vary. The No Action Alternative considered no federal action, but incorporated 2,000 projected non-federal CBM wells as a connected action. Acres of potential surface disturbance associated with these alternatives are shown in **Table 2**. In addition, other alternatives were considered but not analyzed in detail for varying reasons.

Alternatives Considered but Not Analyzed in Detail

A number of additional alternatives to the Proposed Action were considered for the Wyodak CBM Project but were not carried through the full analysis in this EIS for various reasons. These alternatives and the reasons they were not considered to be feasible are listed below.

Restrict Timing on Approval of Federal Wells

This alternative considered slowing the rate of approval for the federal wells included in the Proposed Action or Alternative 1. It was not analyzed in detail because there was enough flexibility in implementing the Proposed Action or Alternative 1 to regulate the timing of approval for federal wells. The decision to approve each well is based on the site-specific analysis completed for each APD/POD. The rate at which federal wells are approved could be slowed down, but the mix of mineral ownership in the project area would lead to proportionally more wells being drilled on private and state leases to make up for the reduced number of federal wells approved. This could lead to drainage of gas from the federal CBM mineral estate.

Reduce the Number of Federal Wells Approved

This alternative considered the drilling of fewer federal wells than proposed under the Proposed Action or Alternative 1. It was not analyzed in detail because there is enough flexibility in the implementation of the Proposed Action or Alternative 1 to approve fewer federal wells. Approving fewer federal wells could lead to drainage of federal gas as discussed above. The decision to approve each well is based on the site-specific analysis completed for that well's APD/POD.

Table 2 Acres of Potential Surface Disturbance Associated with Proposed CBM Development			
	Alternative 1	Proposed Action	No Action
<i>Potential Short-term Disturbance Only (until facilities completed and reclaimed)</i>			
Drill Sites (during drilling) ^a	1,375	825	550
Water Discharge Pipelines	7,500	4,500	3,000
Pod Gathering Lines to Trunklines	4,850	2,910	1,940
Trunklines to Compressors	2,038	2,038	2,038
<i>TOTAL Potential Short-term Disturbance (acres) (percentage of area analyzed)</i>	<i>15,763 0.7%</i>	<i>10,273 0.7%</i>	<i>7,528 0.5%</i>
<i>Potential Long-term Disturbance (during production)</i>			
Well Access Roads & Pipelines (gathering lines including produced water discharge points)	9,000	5,400	3,600
Well Sites for Productive CBM Wells	60	36	24
Production Pod Facilities	125	75	50
New Field Compressor Stations	51	51	51
New Booster Compressor Stations	37	37	37
New Transmission Pipeline Compressor Stations	15	15	15
Improved Roads to Production Pods	1,500	900	600
<i>TOTAL Potential Long-term Disturbance (acres) (percentage of area analyzed)</i>	<i>10,788 0.5%</i>	<i>6,514 0.4%</i>	<i>4,377 0.3%</i>
TOTAL POTENTIAL SURFACE DISTURBANCE (acres) ^b (percentage of area analyzed)	26,491 1.2%	16,751 1.1%	11,881 0.8%

^a Up to 10% more new CBM wells may be drilled (drill sites) than are produced (as well sites). Short-term drilling disturbance from unproductive wells is included.
 Acreage for drill sites (during drilling) encompasses acreage for productive CBM well sites.

^b Does not include acreage for productive CBM well sites. This acreage already is included under drill sites (during drilling).

Notes:

Potential Surface Disturbance is estimated in acres. (For reference: 43,560 square feet = 1 acre; 640 acres = 1 square mile).

Short-term Disturbance = Disturbance during drilling or installation of facilities, followed by reclamation, up to approximately 3 years.

Long-term Disturbance = Disturbance continuing during the productive life of the project, which would be approximately 12 to 20 years, followed by reclamation.

Inject Produced Water Underground

Underground injection to dispose of the produced water was considered as an alternative. Produced water from existing projects has been of relatively good quality. Total Dissolved Solids (TDS) levels have averaged 764 mg/l TDS for CBM water discharges reported to WDEQ (WDEQ, 1998), well within Wyoming standards for livestock water. However, underground injection of produced water currently is being researched as a disposal and/or aquifer enhancement option, but is not a viable alternative at present.

Disposal of produced water in Wyoming currently is limited to aquifers exempt from the definition of fresh and potable water (WOGCC, 1998). Injection of this water into an exempt formation, as allowed under current regulations, potentially would make water now suitable for irrigation and livestock unusable for any future use. This action would mitigate potential surface water impacts but would create additional potential groundwater impacts.

Injection requires that the receiving formation be capable of accepting the quantity of water being injected. Injection of CBM produced water into the Wasatch Formation above the coal seam has not been tested. Injection into aquifers within the Tullock Member of the lower Ft. Union Formation has been studied by the City of Gillette with encouraging results. Injection into the coal seam would defeat the purpose of removing water from the coal seam to produce methane. Also, injection would require a system of wells and pipelines that would increase the total surface disturbance. Finally, because the produced water is suitable for livestock, wildlife, and possibly irrigation, surface disposal allows it to be put to subsequent beneficial uses.

MANAGEMENT CONSIDERATIONS/RATIONALE FOR DECISIONS

The decision to approve Alternative 1 is based on careful consideration of a number of factors, including the following: 1) consistency with land use and resource management plans; 2) public involvement, scoping issues, and EIS comments; 3) relevant resource and economic considerations; 4) agency statutory requirements; 5) national policy; and 6) measures to avoid or minimize environmental harm.

Consistency with Land Use and Resource Management Plans and Other Oil and Gas Decisions

The decision to authorize the Wyodak CBM Project Alternative 1 is in conformance with the overall planning direction for the area. The Buffalo Resource Area Resource Management Plan (USDI BLM, 1985 as amended or maintained) provides that oil and gas exploration and development will be authorized in accordance with lease provisions. Lease constraints and development will be subject to land use decisions described in the "Planning Decisions" section of the RMP Record of Decision. This decision is consistent with BLM leasing decisions and other oil and gas decisions made for the Gillette North Environmental Assessment (USDI BLM, 1996) and the Gillette South

Environmental Impact Statement (USDI BLM, 1997). Only the requirements for the formation of the PRAGMO group have been changed (ROD, page 30).

Public Involvement, Scoping Issues, and EIS Comments

The Council on Environmental Quality (CEQ) regulations require an “early and open process for determining the scope of issues to be addressed and for identifying significant issues related to a Proposed Action” (40 CFR 1501.7). Scoping was conducted through a direct mail process and a public meeting. The mailing list included landowners, business groups, environmental groups, and other interested members of the public.

The Notice of Intent (NOI) for this EIS was published in the *Federal Register* on January 29, 1998, and a public meeting was held on February 5, 1998 at the Holiday Inn in Gillette. All substantive comments the BLM received during these meetings have been used to direct the scope and analysis of this EIS. Public scoping comments were accepted through March 2, 1998. A letter that summarizes both the issues raised at the public scoping meeting and contained in written comments is presented as Appendix C (3/19/98 BLM letter to “Partner”) of the DEIS.

On May 14, 1999, both the Environmental Protection Agency’s Notice of Availability and the BLM’s Notice of Availability for the DEIS were published in the *Federal Register*. Over 850 copies of the DEIS were made available to the public and interested agencies for a 45-day public comment period. Subsequently, the public comment period was extended for 15 additional days. The date by which comments had to be received was July 14, 1999.

The FEIS was distributed to the public for review and comment prior to October 1, 1999. The Notice of Availability for the FEIS appeared in a BLM-prepared Federal Register Notice on October 4, 1999, and in an Environmental Protection Agency-prepared Federal Register Notice on October 1, 1999. Approximately 850 copies of the FEIS were mailed to federal, state, and local government agencies, organizations, industries and individuals. The 30-day comment period for the FEIS ended October 31, 1999.

Twenty representatives of Native American Indian Tribes were notified of their opportunity to provide comment, and were mailed copies of the DEIS and the FEIS. The following Native American Indians were included in the mailing list: Crow, Northern Cheyenne, Arapaho, Shoshone, Arikara, and Western Sioux Lakota Tribes. No written comments from Native American representatives were received during the comment periods for either the DEIS or FEIS.

DEIS Comments

Fifty-two comment letters were submitted by the public and interested agencies during the 60-day comment period and shortly after the formal comment period closed on the Wyodak CBM Project DEIS. All letters received were reproduced in Appendix E of the FEIS. All comments were considered and included as part of the BLM decision making process. A response by comment category was prepared and included in Chapter 5 of the FEIS.

Several of the commentors on the Draft EIS raised similar concerns. The following areas of concern summarize those most commonly expressed by commentors. The BLM has considered these concerns, and all other concerns expressed, in the process of reaching this decision, as summarized below. These have also been addressed in the FEIS.

- A reasonable range of alternatives, including alternatives for beneficial use and disposal of produced water, was not considered. The No Action alternative included non-federal CBM wells.
- More CBM development is anticipated than is analyzed. As many as 15,000 to 20,000 CBM wells have been estimated by industry sources, yet only 5,000 new wells are analyzed in the EIS.
- A coordinated and detailed plan that provides for adequate mitigation and monitoring is needed. The BLM's plans for implementation of the EIS are not disclosed.
- The BLM has attempted a groundwater model for an extremely large area with very little data. The methods used and the model results are questioned.
- The increase in surface flows (from the discharge of CBM produced water) and resulting impacts to existing uses and ecosystems at specific locations may be dramatic. Realistic estimates of the volume of water produced were not used. This water is likely to be wasted.
- Water management planning is essential, yet is not addressed in any detail. Water management plans should be limited to BLM jurisdictional lands.
- A more thorough and site-specific discussion of terrestrial and aquatic impacts resulting from CBM development is needed.
- The characteristics of surface waters (flow regimes, temperature, turbidity, water chemistry, water pollution potential, and potential toxic pollutants) anticipated as a result of CBM development are not disclosed and analyzed in comparison with aquatic habitats and species' requirements. Improved analysis for the sturgeon chub is needed.
- CBM development and the associated production of water will impact nearby coal mining operations. These impacts are not addressed adequately.
- CBM development and the associated production of water may adversely affect the ability to mine uranium at nearby locations using in-situ leaching procedures.
- The BLM has attempted an air quality model with very little data. Projected CBM and coal operations are difficult to characterize. The methods used and the model results are questioned. Projected coal mining and transportation of coal by railroad in 2015, and the impacts resulting from these activities, were not accurately considered in the model. Projections of regional haze

that would occur at National Parks, National Monuments, National Forest Wildernesses, and the Northern Cheyenne Reservation are unrealistically high worst case estimates.

- Noise impacts need further study.
- Gas compressor stations associated with CBM development may produce dangerous levels of formaldehyde (a known carcinogen). This impact is not addressed adequately.
- The effects that dewatering the coal seam will have on the subsurface, including lowered water levels and yields in nearby water wells, aquifer collapse, ground subsidence, methane seepage into homes or water wells, and underground fires are not adequately addressed.
- The anticipated impacts to the Fortification Creek Wilderness Study Area are not adequately addressed.
- Impacts to land uses, land use conflicts, and compensation to landowners are not addressed adequately.
- Soil and vegetation loss, noxious weed invasions, and reclamation requirements are not adequately addressed.

FEIS Comments

The BLM received 12 letters commenting on the FEIS during the public comment period. All written comments were considered by the BLM in the preparation of this ROD. The comment letters received on the FEIS may be reviewed by contacting the BLM Field Manager, Buffalo, Wyoming.

The comments received on the FEIS did not include any new substantive information that necessitated revisions to the EIS. The comments that provided specific information on firearms and selenium toxicity were considered in reaching the decisions set forth in this ROD.

Written comments on the FEIS were received from the following:

- Bill and Bernadette Barlow
- CMS Energy Oil and Gas (Steven R. Fly, District Landman)
- Gillette Area Groundwater Monitoring Organization (Philip A. Murphree, Chairman - GAGMO)
- Ann Hinckley
- Laurel McCoul, Prairie Springs Ranch
- Powder River Basin Resource Council (Laurel McCoul, Board Member)
- State of Wyoming, Office of Federal Land Policy (Stephen A. Reynolds, Director)
- Triton Coal Company (Scott Benson, Environmental Engineer)
- Wyoming Mining Association (Marion Loomis, Executive Director)
- Wyoming Outdoor Council (Dan Helig, Executive Director)

- U.S. Environmental Protection Agency, Region 8 (Cynthia G. Cody, Chief NEPA Unit, Ecosystem Protection Program)
- U.S. Fish and Wildlife Service (Michael M. Long, Field Supervisor)

In summary, the common concerns contained in comments received on the FEIS were the following. BLM discussion follows each of these concerns.

1. Consistency with applicable resource management plans has not been demonstrated. The environmental consequences of CBM development are not considered in the Buffalo Field Office's RMP.

Discussion:

The management plans discussed oil and gas development and analyzed a certain level of development. The planning decisions were to authorize the leasing of oil and gas. The development of oil and gas is accordance with these decisions. The oil and gas CBM activities analyzed in the Wyodak CBM Project EIS fall within the level of analysis for the management plans.

2. Responses to public comments are inadequate or missing.

Discussion:

As per guidance provided in BLM Manual H-1790-1, "comments are addressed if they: are substantive and related to inadequacies or inaccuracies in the analysis or methodologies used; identify new impacts or recommend reasonable new alternatives or mitigation measures; or involve substantive disagreements on interpretations or significance. Comments which express personal preferences or opinions on the proposal do not require a response." "Although personal preferences and opinions may influence the final selection of the agency's preferred action, they generally will not affect the analysis."

As stated in Chapter 5 Consultation and Coordination section of the FEIS, "Comments containing only opinions or preferences did not receive a formal response. All comments were considered and included as part of the BLM decision making process.

To address the large number of similar comments received on the DEIS, comments and corresponding responses were each grouped based on comment categories. This approach to organizing and responding to comments is in accordance with CEQ guidance as presented in NEPA's 40 Most Asked Questions (29a, paragraph 3)(46 Fed. Reg. 18026, March 23, 1981, as amended, 51 Fed. Reg. 15618, April 25, 1986).

3. Oil and gas and coal lease holder responsibilities are not clear with regard to preventing gas drainage near active coal mines.

Discussion:

The question of gas drainage from a federal lease was asked. In a typical oil and gas drainage situation, when drainage from a federal lease to another lease is identified, the holder of the lease being drained is given two options by the BLM. The lease holder may drill a well or wells and produce the lease to prevent drainage from occurring or may elect to pay compensatory royalty for the value of the gas lost from their lease.

Bureau policy has been that when a coal lease has been issued, the coal lessee is not responsible for royalty payment on gas released as part of the coal mining operation. This policy has been effective, but the recent development of the coal bed methane play has lead to some conflicts because coal mining removes the reservoir from which CBM is produced. Some amount of venting from the reservoir adjacent to the pit also occurs as the pit dewateres the adjacent coal seam. The BLM is attempting to define how far away from the pit the gas resource is affected. Drilling, coring, and desorbing coal cores is being done, and we are looking at bottom hole pressures and gas and water production curves to define an area of impact. The BLM will make the determination whether drainage is occurring or not occurring and will determine if compensatory royalties are due.

Bureau policy is to recover both mineral resources if at all possible. When conflicts occur between the two mineral operators, we will attempt to mediate a settlement. In the case involving Rim Operating, they are the senior lease right, but they were not able to exercise that right because they were not able to gain access to the surface to drill and produce the methane gas. The BLM did work with Rim Operating and Ark Land Company to facilitate an access agreement which sets specific guidelines in place for the methane production and coal production. This agreement is a model which may or may not be used in other potential conflict situations.

4. Well spacing/density was not adequately addressed.

Discussion:

The authority to set or change well spacing is exercised by the WOGCC, and the BLM concurs with the current 40-acre well spacing density set by the WOGCC. As stated in the FEIS, page 5-7, "The current CBM well spacing is 40 acres set by the WOGCC was used for the purposes of this analysis. While well spacing for CBM could become less dense in the future (80 acres), it is not likely to become more dense."

5. The scope of the cumulative impacts analysis was inadequate for wildlife.

Discussion:

The level of detail in the cumulative analysis was defined by the programmatic nature of the document. As PODs are reviewed, further analysis of impacts to wildlife will occur as site-specific details become known and are documented in EAs.

6. The maximum number of wells analyzed in the EIS has already been permitted by WOGCC.

Discussion:

As of November 1, 1999, 3,041 CBM wells have been drilled or spudded.

7. Mitigation is inadequate for wildlife, water, soil, and air quality impacts.

Discussion:

The ROD lists a range of comprehensive mitigation measures that will be used to address impacts. At the time of POD review, these mitigation measures will be applied, as appropriate, based on the professional judgement of BLM specialists. If situations occur that are not covered by these mitigation measures, special conditions of approval will be developed as part of the site-specific environmental analysis.

8. The FEIS did not adequately acknowledge that new or additional air quality information was being developed by the coal industry.

Discussion:

The ROD does acknowledge on page 3 that new information has become available since publication of the DEIS. Although this new information has no bearing on the CBM development analyzed in the Wyodak CBM Project DEIS and FEIS and the decision to be made, this new information will be used in future environmental documents to be completed by the BLM.

9. The explanatory introductory paragraph that would emphasize the limitations of interpreting the results of computer modeling was missing from Chapter 4 of the FEIS.

Discussion:

This paragraph was inadvertently left out and we apologize for this omission; however, our response on page 5-21 of the FEIS explained the limitations.

10. The BLM should be responsible for produced water impacts on downstream landowners and should coordinate and track water management plans.

Discussion:

As described in the ROD on pages 4 and 5, the State of Wyoming has authority for produced waters discharged to the surface. The BLM's responsibility is to conserve the federal minerals and to ensure the environmentally sound development of CBM resources. For CBM development, the BLM's authority for water discharge is limited to the design and location of the produced water discharge points. To address and track cumulative impacts, the BLM is requiring operators to provide water management plans. CBM development activities shown in these plans will be tracked as GIS data themes.

11. The BLM cannot defer responsibility for resource management to other agencies.

Discussion:

As described in the ROD on page 3, the various authorities for permitting CBM activity are defined. The BLM cannot override those decisions made by other agencies.

12. The BLM did not analyze the underground injection of produced water as an alternative.

Discussion:

Injection of produced water was addressed in the FEIS, pages 2-27 and 5-10. Injection was not found to be a viable alternative at this time. Tests for produced water injection are currently in progress; positive results may prove that injection will be a viable alternative in the future.

13. The groundwater model needs further refinement as new information becomes available and new techniques are developed to increase gas production.

Discussion:

The groundwater model will be revised and re-run for future BLM NEPA analyses, as needed, when new information becomes available.

14. Further studies regarding potential gas migration into residences are needed.

Discussion:

Methane seepage can occur in the vicinity of near surface coal seams; however, CBM wells in the eastern PRB are projected to be a minimum of 300 feet deep. The need for further studies regarding the potential for methane seepage into residences has not been documented. If this need develops, it will be addressed at that time.

15. A new EIS is needed.

Discussion:

The BLM is developing an action plan to address all current and future submittals of proposed oil and gas exploration or development (including CBM activities).

16. A Biological Assessment (BA) for T&E species is needed.

Discussion:

A Biological Assessment (BA) for T&E species has been prepared and submitted to the USFWS.

17. The BLM should not approve storage of produced water in closed, shallow impoundments, to lessen the likelihood that selenium will bioaccumulate.

Discussion:

Mitigating measures have been added to the Programmatic Mitigation Plan (ROD, page 41 and 45).

18. The BLM should recommend mitigating measures to protect public residences from formaldehyde emissions when compressors are sited on public lands.

Discussion:

A mitigating measure has been added to the Programmatic Mitigation Plan (ROD, page 43).

Rationale for Decision - Relevant Resource and Economic Considerations

The decision to approve the Wyodak CBM Project Alternative 1 takes into account the fact that natural gas is the U.S. Congress and President's energy of choice to comply with the Clean Air Act Amendments of 1990, and helps meet the public need for cleaner burning, less polluting natural gas. The development effort will help meet public needs for natural gas while at the same time resulting in the least degree of irreversible, irretrievable commitment of resources. The long-term productivity of the area will neither be lost, nor substantially reduced, as a result of approving the Wyodak CBM Project.

There is no difference in environmental protection or mitigation measures between the Proposed Action and Alternative 1. The Proposed Action would have authorized the BLM to begin the APD/POD level of analysis for 3,000 new CBM wells instead of 5,000 new CBM wells authorized under Alternative 1, the Approved Project. The Proposed Action is not responsive to the current level of activity and interest in CBM development in the eastern PRB. The Secretary of the Interior is not empowered to deny all federal drilling activity (No Action Alternative) because of environmental concerns not related to threatened or endangered species or their habitats, where oil and gas leases have been issued with surface occupancy rights.

An oil and gas lease grants the lessee the "right and privilege to drill for, mine, extract, remove and dispose of all oil and gas deposits" in the leased lands, subject to the term and conditions incorporated in the federal lease. Because the Secretary of the Interior has the authority and responsibility to protect the environment within federal oil and gas leases, restrictions are imposed on the lease terms.

Leases within the project area for the Wyodak CBM Project EIS contain various stipulations concerning surface disturbance, surface occupancy, and limited surface use. In addition, the lease stipulations provide that the authorized representative of the Department of the Interior may impose

“such reasonable conditions, not inconsistent with the purposes for which the lease is issued, as the BLM may require to protect the leased lands and environment.” None of the stipulations imposed would empower the Secretary of the Interior to deny all drilling activity because of environmental concerns where leases have been issued with surface occupancy rights.

Provisions that expressly provide Secretarial authority to deny or restrict lease development in whole or in part would depend on an opinion provided by the U.S. Fish and Wildlife Service (USFWS) regarding impacts to endangered or threatened species or habitats of species that are listed or proposed for listing (for example, bald eagle). If the USFWS concludes that the Proposed Action and alternatives would likely jeopardize the continued existence of any endangered or threatened plant or animal species, then CBM development, including APD(s) and related Sundry Notices, may be denied in whole or in part on the affected federal leases.

Agency Statutory Requirements

The decision is consistent with all Federal, State, and County authorizing actions required to implement the Approved Project. All pertinent statutory requirements applicable to this proposal were considered. These include consultation with the FWS regarding threatened, endangered, and candidate species; consultation with the Army Corp of Engineers; coordination with the State of Wyoming regarding wildlife, environmental quality (including air quality and water quality), and oil and gas conservation; and coordination with local government representatives.

National Policy

Private exploration and development of federal oil and gas leases is an integral part of the BLM oil and gas leasing program under authority of the Mineral Leasing Act of 1920 and the Federal Land Policy and Management Act of 1976. Natural gas is the “energy-of-choice” by the Congress and President because it is clean burning and less polluting. Therefore, the decision is consistent with national policy.

Measures to Avoid or Minimize Environmental Harm

The adoption of the Hydrologic Monitoring and Mitigation, Specific Monitoring Activities, Programmatic Mitigation Plan, and Standard “Conditions of Approval” for APDS, BLM-Buffalo Field Office identified below in this ROD and in the Wyodak CBM Project FEIS represent all practicable means to avoid or minimize environmental harm.

COMPLIANCE AND MONITORING

Because of the importance of mitigation for avoiding or minimizing adverse impacts, a monitoring program shall be implemented by the Wyodak CBM Project Operators, Cooperating Agencies, and the BLM. Guidelines for monitoring are set forth below in sections “Specific Monitoring Activities” and “Programmatic Mitigation Plan” in this decision. The BLM in coordination with other agencies

and the Operators or their contractors will conduct monitoring in accordance with the provisions of this decision. The Operators and/or the BLM will provide qualified representatives to monitor and validate construction and reclamation, and provide for compliance commensurate with this decision.

The EIS prepared for the Wyodak CBM Project will guide implementation of CBM development; however, it is not the final environmental review upon which approval of all actions in the area will be based. Site specific evaluations will be required for each well and associated access roads, pipelines, and other actions in accordance with the BLM National Environmental Policy Act Handbook (H-1790-1). This provision for site specific evaluation of environmental protection needs will ensure that there is optimum consideration given to resource protection.

Hydrologic Monitoring and Mitigation

An integral part of project design is the hydrologic monitoring that detects impacts on other water users and provides data for control and operation of the Companies' CBM projects. Monitoring plans administered by the State of Wyoming and the BLM will address the following: objectives; standards; procedures; timeframes; data management; and groundwater and surface water monitoring.

Plans will address the following:

- Monitoring required under the terms of NPDES discharge permits issued by the WDEQ, APDs approved by the WOGCC or surface management agency (BLM or FS), groundwater or surface water appropriation permits approved by the WSEO, and on-location pit permits approved by the WOGCC;
- Requirements for reporting on surface flows encountered during drilling to WOGCC; and
- Requirements contained in any executed Water Well Agreement.

Plans for hydrologic monitoring and mitigation will be re-evaluated periodically by the authorizing agencies in collaboration with the BLM, other involved surface management agencies, WDEQ, WSEO, WOGCC, CBM operators, landowners, coal operators, and other downstream interests.

Whether production of methane occurs by encountering free gas trapped in the coal seam or by pumping water to reduce pressure and induce gas flow, it is possible that nearby water wells completed in the coal will experience a decline in hydraulic head (for example, an increase in the depth to the static water level in the well bore). If the decline in head were a significant part of the total available head at a particular water well, then that water well likely will experience a reduction in its capacity to deliver water (yield) and possibly an increase in the concentration of methane.

Monitoring has been occurring in the Gillette North CBM Project EA and Gillette South CBM Project EIS assessment areas to validate predicted impacts and to identify needed mitigation. This monitoring will be continued and expanded to cover the Wyodak CBM Project EIS assessment area.

The sample Water Well Agreement, previously worked out by landowners and CBM operators as part of the Gillette North CBM Project EA and Gillette South CBM Project EIS, will be required to be offered to affected surface owners before federal APD's will be approved. BLM will continue to suggest that operators also make this agreement available to surface owners when developing private- and state-owned minerals. A copy of this agreement is contained in Appendix D of the DEIS.

The water well agreement format was developed by a working group of affected landowners and industry representatives (USDI BLM, 1997). The BLM is not a party to this agreement. The BLM requires that CBM operators on federal leases offer this agreement or a comparable agreement to affected landowners. The Water Well Agreement between a CBM operator and an affected landowner addresses monitoring of any properly-permitted well that falls within the Circle of Influence (COI) of a CBM production well. This COI is defined as a one-half mile radius around a CBM well. The Water Well Agreement also addresses how the COI would be expanded, should there be interference with a water well within the COI. If no water well falls within the initial COI, the COI would be expanded to the next nearest water well. If wells within the COI are impaired by CBM activities, they can be mitigated by reconfiguring, redrilling, installing a new well, or by other means.

If landowners do not accept the Water Well Agreement, a second option for water well mitigation will be used. This would be mitigation of CBM impacts in accordance with state water law. This would occur if a determination showed CBM development to be interfering with historic permitted usage of water. Neither well yields or water levels are guaranteed by a water right. Mitigation under state law would be developed on a case-by-case basis, in consultation with the WSEO, the affected landowner, the operator, and the BLM. Possible ways in which mitigation could be accomplished at the cost of the operator are: temporary replacement with commercially-purchased water or water produced by the operator, or reimbursement to a well owner for increased pumping costs associated with a greater lift. Permanent replacement would be accomplished by drilling a replacement well.

Through the independent groundwater monitoring program being carried out by the BLM and the WSEO, information on lowered water levels (drawdown of the static water levels in wells completed within the coal seam) and on the status of the sand aquifers is being obtained and tracked. This information will enable the BLM and the WSEO to evaluate impacts. This information could be greatly supplemented if all monitoring information being gathered by operators were brought into one common database. The coal operators are carrying out this type of activity under the direction of the Gillette Area Groundwater Monitoring Organization (GAGMO).

The Gillette North EA and the Gillette South EIS contained requirements that the CBM operators form a group, Power River Area Groundwater Monitoring Organization (PRAGMO), that would be similar to the coal operators' GAGMO group. The purpose of the group was to provide a common reporting method and database of their monitoring results. The data this group was to gather was to be compiled, interpreted and furnished to the BLM and the WSEO along with a yearly combined drawdown map showing the results of their CBM activity. Their comprehensive, un-interpreted data also was to be furnished to the agencies. Because of the confidential nature of some of the data and

the intense competition among companies in the coal bed methane play, the information sharing which was to have been required met with considerable resistance from industry.

As an alternative to the PRAGMO group, the Methane Operators Group has proposed that industry is willing to drill and equip a monitoring network for the BLM and WSEO containing up to two well pairs or triples per township in the project area. This will allow the BLM and the WSEO to maintain an independent monitoring network that will provide a more accurate depiction of the actual drawdown that is occurring area-wide. These dedicated wells will not be influenced directly by pumping, as are the CBM production wells from which operators are getting their information. This monitoring network has been incorporated within project design in place of the PRAGMO group requirements.

Specific Monitoring Activities

Groundwater

In lieu of the PRAGMO requirement described in the DEIS, the following will be required from the appropriate CBM operator(s) as the Approved Project is implemented:

Baseline static water levels, production capacity and methane concentrations for all properly permitted wells within the COI as defined by the Water Well Agreement, in Appendix D of the DEIS. Data is to be furnished to the BLM and WSEO in an electronic format on a quarterly basis.

Monthly reports containing the following information for each CBM well will be submitted to the WOGCC: a) well name, water well permit number, API number, and location; b) reporting dates, name of individual responsible for report, and method of measurement; c) total volumes of water and gas produced during the reporting period and cumulatively since reporting began; and d) remarks or comments regarding data acquisition. The WOGCC will forward these monthly reports to the WSEO and the BLM in an electronic format.

Monitoring of produced water discharges as required by WDEQ for NPDES permits. Report is to be furnished to the WDEQ and the BLM.

Water quality analyses for surface flows encountered during drilling, as required by WOGCC.

Drilling, completion, and equipping, to BLM specifications, of additional (up to two sites per township) paired or tripled dedicated monitor wells by industry. Wells are to be operated by BLM and/or WSEO.

Depending on available agency funding, possible additional financial support for data collection and support in compiling and interpreting the data.

The following monitoring will be continued by the BLM as a result of the Marquiss, Lighthouse, and Gillette North and Gillette South CBM projects to provide independent verification of hydrologic activities. Depending on federal budget availability, it may become necessary for the CBM operators to pay for some or all of this monitoring through cost reimbursement.

The BLM will conduct continuous monitoring of groundwater levels and gas pressure of selected wells completed in the coal and periodic (once every one to two months) measurement of methane concentrations at these wells. Several of these monitoring sites could include additional well(s) near the coal well completed in the next shallower sand(s) above the coal. Some of the well sets will include a coal completion well and a well completed in the next sand below the coal. If adequate existing wells are available, they may be substituted for some of the wells described in this analysis (or possibly added to the network). Additional wells will be required with the new CBM development proposed in this EIS. The monitoring well schedule and final location of monitoring wells ultimately would be a function of the final CBM development scenario and schedule. The BLM will conduct the following sampling:

Periodic (one or two times per year) monitoring of additional water wells that operators are not monitoring, located farther from the project area.

Water quality sampling from selected monitoring wells on a semi-annual basis, analyzed for the constituents shown in **Table 3**.

Table 3	
Required Constituents for Water Quality Sampling from Monitoring Wells	
Parameter	Unit
Total Petroleum Hydrocarbons (TPH)	mg/l
pH	Standard Units
Total Dissolved Solids (TDS)	mg/l
Specific Conductance	µmhos/cm
Chlorides	mg/l
Sulfates	mg/l
Radium-226	pCi/l
Aluminum*	µg/l
Total Antimony	µg/l
Total Arsenic	µg/l
Total Barium	µg/l
Total Beryllium	µg/l
Cadmium*	µg/l
Chromium*	µg/l
Copper*	µg/l
Cyanide (total)	µg/l
Total Iron	µg/l
Lead*	µg/l
Total Manganese	µg/l
Mercury*	µg/l

Table 3
Required Constituents for Water Quality Sampling from Monitoring Wells

Parameter	Unit
Nickel	µg/l
Phenol	µg/l
Selenium*	µg/l
Silver*	µg/l
Total Thallium	µg/l
Zinc*	µg/l
Hardness	mg/l as CaCO ₃

Notes:

µmhos/cm = thousandths of unit of conductance per centimeter (2.54 centimeters = 1 inch)

mg/l = milligram per liter (1 mg = 1 ppm [part per million]; 1 liter = 0.264 gallons)

µg/l = microgram per liter (1 µg = one thousandth of a milligram or 0.001 mg or 1 ppb [part per billion])

* Refers to the acid soluble portion which is derived as the fraction that passes through a 0.45 µm membrane filter after the sample is acidified to a pH of 1.5 - 2.0 with nitric acid.

Additional Monitoring Wells

In coordination with the WSEO, an adequate number of monitoring wells will be added to the existing monitoring wells that were established previously as part of the Gillette North CBM Project EA and Gillette South CBM Project EIS assessment and decision process (**Table 4**). Installation of the monitoring wells required under the Gillette South EIS and Gillette North EA progressed in 1998 with the addition of one new well pair and the finalization of one ongoing completion. The WSEO completed five monitoring locations (4 paired) and plans on completing a fifth pair in 1999. The BLM and WSEO will need additional monitor wells at the locations shown in **Table 5**. Each location will consist of two or more wells in the coal(s) and sand(s).

Table 4 (continued)
Completed CBM Monitor Wells

Approximate Well Location	Target Zone of Completion	Comments
T53N R73W S21	COAL	Existing well Hall #33- 2633
T53NR73W S21	OVERBURDEN SAND	Sand well of well pair.
T49N R73W S3	COAL	WSEO CBM MON #2
T49N R73W S3	OVERBURDEN SAND	WSEO CBM MON #2W
T49N R74W S36	COAL	WSEO CBM MON #1
T49N R77W S1	COAL	Gilmore O&G well acquired 3- 98, plugged back and recompleted
T48N R73W S36	COAL	WSEO CBM MON #3
T48NR73W S36	OVERBURDEN SAND	WSEO CBM MON #3W
T48NR72WS22	COAL	Coal well of a set of wells completed for the Marquiss project.

Table 4 (continued)
Completed CBM Monitor Wells

Approximate Well Location	Target Zone of Completion	Comments
T48NR72WS22	OVERBURDEN SAND	Overburden sand well of a set of wells completed for the Marquiss project.
T48NR72WS22	SHALLOW CONFINED SAND	Additional (shallower) overburden sand completed at this location to evaluate vertical leakage.
T48NR72WS22	UNCONFINED SAND	Unconfined (shallowest saturated) sand completed at this location to evaluate vertical leakage and recharge.
T48NR77WS12	COAL	Arco Federal 12-2 Drilled out bridge plug plugged back and recompleted. (SASQUATCH)
T47N R71W S19	COAL	Existing (Cordero well).
T47N R72W S2	COAL	Coal well of a set of wells completed for the Marquiss project.
T47NR72W S2	OVERBURDEN SAND	Overburden sand well of a set of wells completed for the Marquiss project.
T47N R72W S7	COAL	Hoe Creek DOE project.
T47N R72W S7	OVERBURDEN SAND	Hoe Creek DOE project.
T47N R72W S36	COAL	Existing (Amoco well).
T47N R73W S16	COAL	WSEO CBM MON #4
T47NR73W S16	OVERBURDEN SAND	WSEO CBM MON #4W
T46N R72W S6	COAL	Existing (Cordero well).
T46N R72W S25	COAL	Coal well of well pair
T46NR72W S25	OVERBURDEN SAND	Sand well of well pair
T46NR74W S16	OVERBURDEN SAND	Sand well of well pair
T45N R71W S6	COAL	Coal well of well pair
T45N R71W S6	OVERBURDEN SAND	Sand well of well pair
T45N R73W S1	COAL	Coal completion in a dual completion well.
T45NR73W S1	OVERBURDEN SAND	Sand completion in a dual completion well.
T45N R74W S36	COAL	WSEO CBM MON #6
T45NR75WS31	COAL	Shogrin Federal #2 acquired from Exxon 11- 96.
T44N R71W S31	COAL	Coal well of three well set
T44NR71WS31	OVERBURDEN SAND	Overburden sand well of three well set
T44NR71WS31	UNDERBURDEN SAND	Underburden sand well of three well set
T44N R72W S14	COAL	Coal well of well pair
T44NR72W S14	OVERBURDEN SAND	Sand well of well pair
T43N R71W S31	COAL	Coal well of well pair
T43NR71W S31	OVERBURDEN SAND	Sand well of well pair

Table 4 (continued)
Completed CBM Monitor Wells

Approximate Well Location	Target Zone of Completion	Comments
T42N R72W S36	COAL	Bowers 4- 36

Table 5 (continued)
Proposed CBM Monitor Wells

Approximate Well Location	Comments
T40N R72W S16	Two or More Wells in the Coal(s) and Sand(s)
T40N R72W S36	Two or More Wells in the Coal(s) and Sand(s)
T40N R73W S16	Two or More Wells in the Coal(s) and Sand(s)
T40N R73W S36	Two or More Wells in the Coal(s) and Sand(s)
T40N R74W S14	Two or More Wells in the Coal(s) and Sand(s)
T40N R74W S36	Two or More Wells in the Coal(s) and Sand(s)
T41N R72W S16	Two or More Wells in the Coal(s) and Sand(s)
T41N R72W S36	Two or More Wells in the Coal(s) and Sand(s)
T41N R73W S16	Two or More Wells in the Coal(s) and Sand(s)
T41N R73W S36	Two or More Wells in the Coal(s) and Sand(s)
T41N R74W S16	Two or More Wells in the Coal(s) and Sand(s)
T41N R74W S33	Two or More Wells in the Coal(s) and Sand(s)
T41N R75W S16	Two or More Wells in the Coal(s) and Sand(s)
T41N R75W S36	Two or More Wells in the Coal(s) and Sand(s)
T42N R72W S16	Two or More Wells in the Coal(s) and Sand(s)
T42N R73W S16	Two or More Wells in the Coal(s) and Sand(s)
T42N R73W S32	Two or More Wells in the Coal(s) and Sand(s)
T42N R74W S22	Two or More Wells in the Coal(s) and Sand(s)
T42N R75W S16	Two or More Wells in the Coal(s) and Sand(s)
T43N R71W S22	Two or More Wells in the Coal(s) and Sand(s)
T43N R72W S28	Two or More Wells in the Coal(s) and Sand(s)
T43N R73W S16	Two or More Wells in the Coal(s) and Sand(s)
T43N R73W S36	Two or More Wells in the Coal(s) and Sand(s)
T43N R74W S16	Two or More Wells in the Coal(s) and Sand(s)
T43N R74W S36	Two or More Wells in the Coal(s) and Sand(s)
T43N R75W S3	Two or More Wells in the Coal(s) and Sand(s)
T43N R75W S17	Two or More Wells in the Coal(s) and Sand(s)
T43N R75W S36	Two or More Wells in the Coal(s) and Sand(s)
T44N R72W S18	Two or More Wells in the Coal(s) and Sand(s)

Table 5 (continued)
Proposed CBM Monitor Wells

Approximate Well Location	Comments
T44N R73W S16	Two or More Wells in the Coal(s) and Sand(s)
T44N R73W S36	Two or More Wells in the Coal(s) and Sand(s)
T44N R74W S16	Two or More Wells in the Coal(s) and Sand(s)
T44N R74W S33	Two or More Wells in the Coal(s) and Sand(s)
T44N R75W S16	Two or More Wells in the Coal(s) and Sand(s)
T45N R72W S15	Two or More Wells in the Coal(s) and Sand(s)
T45N R73W S36	Two or More Wells in the Coal(s) and Sand(s)
T45N R74W S15	Two or More Wells in the Coal(s) and Sand(s)
T45N R75W S6	Two or More Wells in the Coal(s) and Sand(s)
T45N R75W S36	Two or More Wells in the Coal(s) and Sand(s)
T45N R76W S18	Two or More Wells in the Coal(s) and Sand(s)
T45N R76W S31	Two or More Wells in the Coal(s) and Sand(s)
T46N R72W S16	Two or More Wells in the Coal(s) and Sand(s)
T46N R73W S16	Two or More Wells in the Coal(s) and Sand(s)
T46N R74W S16	Two or More Wells in the Coal(s) and Sand(s)
T46N R74W S36	Two or More Wells in the Coal(s) and Sand(s)
T46N R75W S18	Two or More Wells in the Coal(s) and Sand(s)
T46N R75W S36	Two or More Wells in the Coal(s) and Sand(s)
T46N R76W S16	Two or More Wells in the Coal(s) and Sand(s)
T47N R72W S7	Two or More Wells in the Coal(s) and Sand(s)
T47N R73W S32	Two or More Wells in the Coal(s) and Sand(s)
T47N R74W S8	Two or More Wells in the Coal(s) and Sand(s)
T47N R74W S26	Two or More Wells in the Coal(s) and Sand(s)
T47N R75W S2	Two or More Wells in the Coal(s) and Sand(s)
T47N R75W S36	Two or More Wells in the Coal(s) and Sand(s)
T47N R76W S24	Two or More Wells in the Coal(s) and Sand(s)
T47N R76W S30	Two or More Wells in the Coal(s) and Sand(s)
T48N R73W S28	Two or More Wells in the Coal(s) and Sand(s)
T48N R74W S30	Two or More Wells in the Coal(s) and Sand(s)
T48N R74W S36	Two or More Wells in the Coal(s) and Sand(s)
T48N R75W S30	Two or More Wells in the Coal(s) and Sand(s)
T48N R76W S28	Two or More Wells in the Coal(s) and Sand(s)
T48N R77W S17	Two or More Wells in the Coal(s) and Sand(s)
T49N R73W S24	Two or More Wells in the Coal(s) and Sand(s)
T49N R74W S16	Two or More Wells in the Coal(s) and Sand(s)
T49N R74W S36	Two or More Wells in the Coal(s) and Sand(s)
T49N R75W S36	Two or More Wells in the Coal(s) and Sand(s)

Table 5 (continued)
Proposed CBM Monitor Wells

Approximate Well Location	Comments
T49N R76W S4	Two or More Wells in the Coal(s) and Sand(s)
T49N R76W S19	Two or More Wells in the Coal(s) and Sand(s)
T49N R77W S19	Two or More Wells in the Coal(s) and Sand(s)
T50N R72W S7	Two or More Wells in the Coal(s) and Sand(s)
T50N R73W S16	Two or More Wells in the Coal(s) and Sand(s)
T50N R74W S27	Two or More Wells in the Coal(s) and Sand(s)
T50N R75W S6	Two or More Wells in the Coal(s) and Sand(s)
T50N R75W S36	Two or More Wells in the Coal(s) and Sand(s)
T50N R76W S7	Two or More Wells in the Coal(s) and Sand(s)
T50N R76W S22	Two or More Wells in the Coal(s) and Sand(s)
T50N R77W S8	Two or More Wells in the Coal(s) and Sand(s)
T50N R77W S31	Two or More Wells in the Coal(s) and Sand(s)
T51N R73W S16	Two or More Wells in the Coal(s) and Sand(s)
T51N R73W S32	Two or More Wells in the Coal(s) and Sand(s)
T51N R74W S8	Two or More Wells in the Coal(s) and Sand(s)
T51N R74W S27	Two or More Wells in the Coal(s) and Sand(s)
T51N R75W S7	Two or More Wells in the Coal(s) and Sand(s)
T51N R75W S25	Two or More Wells in the Coal(s) and Sand(s)
T51N R76W S7	Two or More Wells in the Coal(s) and Sand(s)
T51N R76W S15	Two or More Wells in the Coal(s) and Sand(s)
T51N R77W S26	Two or More Wells in the Coal(s) and Sand(s)
T51N R77W S30	Two or More Wells in the Coal(s) and Sand(s)
T52N R73W S16	Two or More Wells in the Coal(s) and Sand(s)
T52N R73W S33	Two or More Wells in the Coal(s) and Sand(s)
T52N R74W S10	Two or More Wells in the Coal(s) and Sand(s)
T52N R74W S29	Two or More Wells in the Coal(s) and Sand(s)
T52N R75W S12	Two or More Wells in the Coal(s) and Sand(s)
T52N R76W S17	Two or More Wells in the Coal(s) and Sand(s)
T52N R77W S20	Two or More Wells in the Coal(s) and Sand(s)
T52N R77W S26	Two or More Wells in the Coal(s) and Sand(s)
T53N R74W S19	Two or More Wells in the Coal(s) and Sand(s)
T53N R74W S36	Two or More Wells in the Coal(s) and Sand(s)
T53N R75W S29	Two or More Wells in the Coal(s) and Sand(s)
T53N R76W S15	Two or More Wells in the Coal(s) and Sand(s)
T53N R76W S32	Two or More Wells in the Coal(s) and Sand(s)
T54N R72W S12	Two or More Wells in the Coal(s) and Sand(s)
T54N R72W S33	Two or More Wells in the Coal(s) and Sand(s)

Table 5 (continued)
Proposed CBM Monitor Wells

Approximate Well Location	Comments
T54N R73W S13	Two or More Wells in the Coal(s) and Sand(s)
T54N R73W S30	Two or More Wells in the Coal(s) and Sand(s)
T54N R74W S4	Two or More Wells in the Coal(s) and Sand(s)
T54N R74W S5	Two or More Wells in the Coal(s) and Sand(s)
T54N R74W S34	Two or More Wells in the Coal(s) and Sand(s)
T54N R75W S7	Two or More Wells in the Coal(s) and Sand(s)
T54N R75W S35	Two or More Wells in the Coal(s) and Sand(s)
T54N R76W S6	Two or More Wells in the Coal(s) and Sand(s)
T54N R76W S36	Two or More Wells in the Coal(s) and Sand(s)
T55N R72W S9	Two or More Wells in the Coal(s) and Sand(s)
T55N R72W S30	Two or More Wells in the Coal(s) and Sand(s)
T55N R73W S6	Two or More Wells in the Coal(s) and Sand(s)
T55N R73W S16	Two or More Wells in the Coal(s) and Sand(s)
T55N R74W S21	Two or More Wells in the Coal(s) and Sand(s)
T55N R74W S36	Two or More Wells in the Coal(s) and Sand(s)
T55N R75W S21	Two or More Wells in the Coal(s) and Sand(s)
T55N R75W S36	Two or More Wells in the Coal(s) and Sand(s)
T55N R76W S35	Two or More Wells in the Coal(s) and Sand(s)
T56N R72W S15	Two or More Wells in the Coal(s) and Sand(s)
T56N R72W S36	Two or More Wells in the Coal(s) and Sand(s)
T56N R73W S8	Two or More Wells in the Coal(s) and Sand(s)
T56N R73W S25	Two or More Wells in the Coal(s) and Sand(s)
T56N R74W S22	Two or More Wells in the Coal(s) and Sand(s)
T56N R75W S1	Two or More Wells in the Coal(s) and Sand(s)
T56N R75W S16	Two or More Wells in the Coal(s) and Sand(s)
T56N R75W S36	Two or More Wells in the Coal(s) and Sand(s)
T56N R76W S18	Two or More Wells in the Coal(s) and Sand(s)
T56N R76W S36	Two or More Wells in the Coal(s) and Sand(s)
T57N R72W S12	Two or More Wells in the Coal(s) and Sand(s)
T57N R72W S31	Two or More Wells in the Coal(s) and Sand(s)
T57N R73W S22	Two or More Wells in the Coal(s) and Sand(s)
T57N R74W S17	Two or More Wells in the Coal(s) and Sand(s)
T57N R74W S36	Two or More Wells in the Coal(s) and Sand(s)
T57N R75W S17	Two or More Wells in the Coal(s) and Sand(s)
T57N R75W S33	Two or More Wells in the Coal(s) and Sand(s)
T58N R74W S36	Two or More Wells in the Coal(s) and Sand(s)
T58N R75W S22	Two or More Wells in the Coal(s) and Sand(s)

Cost Share on Wells to be Monitored by BLM

Where suitable wells do not exist for monitoring, operators will be required to obtain access, permit, drill, and properly complete wells (including PVC casing, stainless steel screen where appropriate, sand pack where appropriate, logging, and cementing) where necessary, in relation to their projects. In addition, operators will provide and install necessary support facilities (shelter and fence) and will be responsible for the cost of the monitoring equipment as specified by the BLM. The BLM will provide requirements for instrumentation and equipment and will provide labor to monitor the wells.

Implementation of Monitoring

The monitoring well schedule and final locations ultimately will be a function of the CBM development scenario and schedule. If necessary, monitoring wells will be added as conditions of approval for APDs/PODs.

Surface Water

The following will be required of the operators:

Monitoring of produced water discharges as required by WDEQ for NPDES permits. Report is to be furnished to the WDEQ and the BLM.

Monitoring of volume of produced water being discharged to the surface as required by the WSEO under Conditions and Limitations specified in each groundwater permit, by the WDEQ under the terms specified in each NPDES permit, and as required by the WOGCC for surface flows encountered during drilling. If the State of Wyoming modifies its CBM reporting requirements, then the revised requirements will apply here.

Additional surface water stations may be needed on the Little Powder, Powder, Belle Fourche, and Cheyenne Rivers and/or their tributaries. This will depend on the location of discharge points, availability of existing data, and magnitude of the projected impact. The cost of this monitoring will be shared by the BLM and the CBM operators. With the projected budgets, it is anticipated that the operators would have to be responsible for most of this cost.

The following will be conducted by the BLM:

Operation of a surface water gauging station on the Belle Fourche River and additional stations, as necessary, downstream of the area to be affected by surface discharge of produced water from the project area. In addition, the Cordero-Rojo Mine complex currently is operating a station on Caballo Creek.

Periodic sampling of water quality will be done at project area discharge points and other locations and analyzed as shown in **Table 3**.

Selected channels receiving produced water will be monitored for signs of accelerated erosion and degradation.

At the BLM operated station(s), stream flow, water temperature, and electrical conductivity of the water will be continuously recorded. In addition, periodic manually collected samples will be analyzed for the constituents listed in **Table 3** with the addition of total suspended sediments (TSS).

Programmatic Mitigation Plan

This programmatic mitigation plan includes a full range of practicable means to avoid or minimize environmental harm. Not all mitigation measures may apply to each site-specific analysis. Additional mitigation requirements that are needed will be a part of site-specific decisions of the APD/POD level of analysis. Mitigation also may result from project monitoring that causes changes in field practices

Mitigating measures that will be required on federal minerals, if applicable site-specifically, at the APD/POD level of analysis are compiled below as a programmatic mitigation plan for CBM development. These mitigating measures also are described in various sections of Chapter 4 of the DEIS, where they are incorporated within the resource impact analyses. They are also compiled in Chapter 2 of the FEIS. Requirements that are Standard Conditions of Approval for CBM APDs are described in **Appendix A**.

Geology and Minerals

- Methane will be controlled through APD conditions of approval that address well control, casing, ventilation, and plugging procedures appropriate to site-specific CBM development plans.

Surface Water

Mitigation measures in the form of water management plans will be developed and applied as a cooperative effort at the APD/POD level of analysis, on a site-specific basis or under a Plan of Development (POD) on a project-level basis (**Appendix A**). This effort will include the agencies with jurisdiction (the BLM, FS, COE, WSEO, WOGCC and/or WDEQ) in consultation with the involved land managers and conservation districts, operators, landowners, and nearby downstream interests, including users of waters and landowners affected by impacts of increased flows on access, ranching, or mining operations. The cooperative efforts of all stakeholders will be necessary in developing water management plans that identify mitigating measures for areas or drainages where high CBM generated flows are or could be impacting existing uses. Some of the measures that could be applied at each site include:

- Produced water may be dispersed in the upper reaches of drainages through the installation of stock tanks.

- Produced water may be transported to distant discharge points, which could require the use of water disposal pipelines that are more than one-half mile long.
- Produced water will be discharged into existing stream channels, reservoirs, stock ponds, and stock tanks in a manner that will not cause increased or accelerated erosion. This has been done effectively in past CBM projects by using energy dissipaters at discharge points and by discharging into channels that are well developed and large enough to handle the increased flows. Energy dissipation can be achieved through the use of rock, placement of concrete control structures and/or the establishment of hydrophytic vegetation.
- Discharge points will be located to minimize spring flooding of fields.
- Discharge outfalls may use alternative outfalls for use with irrigation, as agreed upon by operator and landowner or lessee.
- To handle total flows with the addition of CBM produced waters, existing downstream culverts on lease will be replaced should flows exceed culvert capacity. New culverts and/or low water crossings will need to be sized considering total flows. Off lease, it is recommended that the operator work with other operators and with surface owners in the same drainage to replace downstream undersized culverts that would be affected by their discharge.
- Discharges will be limited to a volume less than or equal to the naturally occurring mean annual peak flow (which is roughly equivalent to a peak generated by a 2-year, 24-hour storm) and which can be handled by the natural channel under anticipated conditions.
- Local springs will be identified, and construction will be avoided in these areas.
- Discharge into playas or constructed, closed shallow impoundments will be avoided unless issues related to potential wetland creation, maintenance of discharge facilities, reclamation, and accountability are agreed upon by the operator and landowner or lessee.
- Discharge points will be selected in stable channels or reservoirs away from any significant downstream headcuts or other major erosional features. Outfall design may include discharge aprons and downstream stabilization of channel side slopes to prevent erosion and provide energy dissipation.
- Discharge facilities will be designed site-specifically using best management practices, to accommodate livestock access to water, to control erosion, and to limit sedimentation.
- Irrigation diversions to increase channel length and in-stream impoundments will be established, as appropriate, and as agreed upon by the operator and landowner or lessee.
- Downstream impoundments may need new or redesigned outlet works in order to handle the steady inflow provided by CBM discharge water.

- As per State of Wyoming effluent limitations and monitoring requirements contained in approved permits, and BLM or FS monitoring requirements contained in approved monitoring plans, volume and water quality parameters will be monitored at discharge sites by CBM producers. Monitoring also will occur at selected stations or downstream points of compliance on the Little Powder, Powder, Belle Fourche and Cheyenne Rivers and/or their tributaries.
- The areal extent of surface disturbance and the length of time that the area will remain disturbed before interim or final reclamation activities commence will be minimized.
- Interim and final reclamation of all disturbed areas will proceed in a timely manner. Reclamation activities will be conducted during time frames established by federal land management agencies, landowners and affected interests.
- Reclamation must produce a natural appearance and must be consistent with site conditions, area management standards, and projected uses, as agreed upon by the operator, landowner or lessee, and appropriate state and federal agencies.
- Reclamation will include, as appropriate, recontouring, establishment of desirable, perennial vegetation, stabilization and erosion control of all disturbed areas. Additional measures, such as topsoil conservation, temporary fencing, mulching, or weed control will be utilized, as appropriate, to ensure long-term vegetative stabilization of all disturbed areas. Reclamation standards will be agreed upon by the operator, landowner or lessee, and appropriate state and federal agencies.
- A water management plan must accompany each plan of development for federal wells and must address all potential CBM development in a watershed area, regardless of surface and mineral ownership (**Appendix A**).
- At the discretion of the surface owner, dams can be removed and the impoundment area reclaimed after the produced water is no longer available.
- Design and siting of discharge facilities must be carefully controlled or limited where channels are not stable, armored, or large enough to accommodate the flows that would be anticipated.
- Design and location of discharge points must be carefully controlled or limited or localized flooding may occur with increased frequency and magnitude where channel or basin capacity is insufficient to handle increased flows.
- Potential impacts to flowing wells or springs, especially those related to scoria aquifers like the one feeding Moyer Springs, can be analyzed site-specifically, as needed, during review of APDs/PODs or Sundry Notices, and impacts mitigated through the application of special conditions of approval for drilling or production operations.

- The quality of discharged waters can be protected through the application of special conditions of approval that provide for the careful location and design of discharge facilities in the vicinity of impaired water bodies.
- The feasibility of designing surface water discharge facilities that could prevent increased sediment loads from reaching the affected segments of the Belle Fourche drainage having curtailed beneficial uses will be analyzed site-specifically.
- Timely recontouring and revegetation of disturbed areas can be required to limit runoff from disturbed areas that could cause sediment concentrations in surface waters to rise over present levels.
- Additional surface water monitoring sites will be established in order to collect information related to surface water characteristics, flow regimes, substrates, and aquatic habitats. Monitoring related to specific habitats, such as those of the sturgeon chub, will be incorporated within monitoring plans at the site-specific APD/POD level of analysis where suitable existing habitat may be affected by CBM activities.

Groundwater

- A standard agreement has been developed by CBM operators and landowners to monitor and mitigate water well impacts caused by CBM operations.

Air Quality

- Air quality issues related to stationary sources of air pollution will be addressed in accordance with the authorities of the WDEQ. Air quality issues related to mobile sources of air pollution will be addressed in accordance with the authorities of the EPA. Visibility impairment within federally mandated Class I areas will be addressed in accordance with federal regulations on regional haze. Visibility impairment at other Class I and sensitive Class II areas will be addressed in accordance with the recommendations from interagency and stakeholder coordinating groups.
- At the discretion of the surface owner, and in accordance with permitting decisions made by the WDEQ, compressors and compressor stations should be sited to avoid sensitive surface resources and potential conflicts with other uses.
- Compressors on federal lands should be located a sufficient distance away from sensitive receptors, such as residences, schools, medical facilities, and recreation areas, to protect the public from potentially harmful exposure to toxic air pollutants such as formaldehyde, a recognized carcinogen. The ambient air concentration level for formaldehyde should remain less than $0.077 \mu\text{g}/\text{m}^3$ in populated areas surrounding compressors and compressor stations that are located on federal surface ownership lands. This concentration level was established for the

State of Idaho. The State of Wyoming has not established an ambient air concentration level for formaldehyde.

- Under the regulatory authority of the WDEQ and at the discretion of the landowner and the CBM operator, the implementation cost and effectiveness of electrification of compressors and other BACT will be considered.

Soils

- Accelerated soil loss will be minimized by limiting the following: the removal of vegetation; the leveling of work areas; and the location of wells on slopes that require cuts-and-fills for well pad construction.
- Timely initiation of reclamation and revegetation efforts will be required to effectively and immediately control accelerated soil loss due to either wind or water erosion.
- Road construction that requires cuts-and-fills will be minimized. Pipeline construction also will avoid steeper slopes where possible. Where necessary, erosion control features, such as water bars or other means of diverting flows off sloping pipeline rights-of-way, will be constructed to control increased runoff and erosion.
- Areas of highly erosive soils will be avoided when drill sites, two-track access routes, and pipeline routes are surveyed and staked, in order to substantially reduce the amount of soil loss.

Vegetation Resources

- Reclamation and final closure of the proposed operations will re-establish vegetation suitable for forage and wildlife habitat in the disturbance areas.
- Actions that will enhance restoration of vegetation productivity from desirable species include the following site preparation and reclamation techniques: mechanical loosening or roughening of the soil where compacted (discing or ripping); fertilization or soil amendment; seeding to proper depth with desirable species; mulching to retain soil moisture; transplanting containerized plants to speed the establishment of slow-growing species; control of noxious weeds; or temporary fencing to exclude livestock until vegetation is re-established successfully. These actions will be required, as appropriate.
- Mitigation activities most effective in reducing the potential for decreased vegetation production include timely and well planned reclamation and effective noxious weed management, avoidance of disturbance within playas (old lake beds), and avoidance of discharge within closed basins, playas, and areas with soils that would be difficult to revegetate. These mitigation activities will be required, as appropriate.

Wetlands

- For any jurisdictional wetlands identified that may be impacted, a detailed mitigation plan would be developed during the APD/POD or Sundry Notice approval process. Federal requirements to replace all impacted wetlands would mitigate this loss, so environmental impacts would occur only during the life of the project (including reclamation).
- The State of Wyoming Department of Environmental Quality, Water Quality Division administers a State Wetland Bank. Landowners have the opportunity to “bank” newly created or expanded wetland areas. While banking provisional wetlands from CBM discharges does serve to record the existence or non-existence of prior non-wetland status, there is no temporary mitigation. Wetlands used for mitigation purposes become jurisdictional and must be maintained in perpetuity. If wetland characteristics are lost due to inadequate hydrology, or other factors, then the banked credit is lost.
- Mitigation activities most effective in reducing the potential for adversely impacting existing wetlands include the following: avoidance of discharge within playas and closed basins; avoidance of discharge within or near existing wetlands (if increased discharge volumes or subsequent recharge of shallow aquifers would inundate and kill woody species, especially willows or cottonwoods); redirection of discharges to mimic natural flows of artesian wells or springs; and avoidance of disturbance within all delineated or recognized wetlands.
- At the discretion of the surface owner, fencing of wetlands and providing off-site watering for livestock could be used to allow vegetation development and maintenance of water quality in key wetlands. Any fences used should be placed well back from the wetlands to prevent waterbird mortalities and should be constructed to standards that allow big game movement.
- If possible, wetlands and ponds will be built on accessible public lands where recreational users can benefit from the development.

Wildlife

- All power lines will be built to protect raptors from accidental electrocution.
- Power line corridors will avoid wetlands, to the extent possible, in order to reduce the chance of waterfowl hitting the lines.
- After considering other resource concerns, and at the discretion of the surface owner, several small ponds can be consolidated into one larger pond in order to provide more open water and a longer shoreline at one site, which may be more beneficial to wildlife.
- The appropriate standard seasonal or year-long stipulations for raptors, sage grouse, and big game, as identified by the BLM’s Resource Management Plan, will be applied.

- Roads will be constructed to the minimum standard needed, so that disturbance to soil and vegetation on each road would be minimized.
- Fences along service roads will be avoided unless absolutely necessary, in order to prevent a maze of barriers to big game movements. Fences will be constructed to standards that allow for easy big game passage, in order to avoid big game entanglements.
- All CBM operators and their contractors/subcontractors should have strict policies of no firearms in their vehicles, to minimize concerns regarding poaching and wildlife law enforcement.
- Waterborne selenium concentrations should be 2 µg/l or less for the protection of waterfowl, shorebirds, and other wildlife from adverse effects.
- CBM produced water should not be stored in shallow, closed impoundments or playas. Impoundments that are designed as flow-through systems will lessen the likelihood that selenium will bioaccumulate to levels that will adversely affect wildlife.

Fisheries

- At the discretion of the surface owner, several small ponds could be consolidated into one larger pond that may have the characteristics needed to support a fishery.
- At the discretion of the surface owner, reservoirs developed as part of CBM activities could be sited within natural stream courses, to provide benefits to fish and wildlife resources.
- Under the authority of the WDEQ, CBM produced water and receiving waters should be analyzed before wetlands, ponds, or lakes are formed or expanded. Selenium levels that would cause adverse effects in fish or waterfowl should be not be present.

Special Status Species

- Surveys for nesting mountain plovers are recommended if ground disturbance (wells, roads, pipelines, etc) of the proposed project occurs between May 1 and June 30.
- Special habitats for raptors will be analyzed site-specifically during the review of the APD/POD or Sundry Notices. A minimum disturbance-free buffer zone of one-half mile will be established for all raptors during the nesting season (February 1 through July 31), in accordance with the BLM's Resource Management Plan for the area. Enlarged disturbance-free buffer zones will be established for specific species, as appropriate, at the APD/POD level of analysis.
- Prairie dog towns will be surveyed for the presence of black-footed ferrets if the towns meet USFWS guidelines. Disturbance in prairie dog towns will be avoided or minimized, to protect sensitive species such as the burrowing owl.

- A disturbance-free buffer zone of one-quarter mile is established around a sage grouse lek to reduce the likelihood that proposed activities will disrupt breeding and nesting activities. A seasonal timing restriction will extend outward for another 1³/₄ mile from the one-quarter mile buffer-free zones applicable during February 1 through July 31.
- At the discretion of the surface owner, native species will be planted to re-establish special habitats.

Cultural Resources

- All areas of proposed ground disturbing activity will be inventoried for cultural resources at the APD/POD or Sundry Notice phase of each action.
- Specific plans for avoidance or data recovery will be recommended for any significant sites within the area of potential effect of the proposed activities.

Land Use and Transportation

- If CBM development activities are proposed in the vicinity of scattered subdivisions near Gillette, site-specific mitigating measures will be developed to minimize the impacts and to resolve conflicts.
- Over the project life, uneconomic and depleted wells will be plugged and abandoned, and the disturbance reclaimed and revegetated to approximate pre-project conditions.
- Reclamation and final closure of the proposed operations will re-establish the land uses of grazing and wildlife habitat in the disturbance areas.
- CBM facilities such as production pods or compression facilities will be fenced as specified by the BLM. Access from properties adjacent to production pods or compression facilities may be restricted by this fencing.
- Roads and facilities no longer needed will be removed and the affected area will be rehabilitated.
- Where feasible, each access road will be constructed in a transportation corridor that will also include gas and water pipelines, and electrical cables.

Visual Resources

- Gathering lines, water lines, high pressure gas lines and underground electrical cables would be located along road rights-of-way whenever feasible.
- Long-term visual impacts will be minimized by designing permanent structures to harmonize with the surrounding landscape to the extent feasible, recontouring and revegetating disturbed areas no longer needed for operations as soon as practicable, and by reshaping straight edges of

clearing resulting from roads, pipelines, well pads, and compression facilities to create irregular or indistinct edges.

- Proposed facility developments on BLM-administered federal surface would be consistent with BLM management objectives for mapped VRM classes.
- All proposed wells and facilities on FS-administered federal surface would be consistent with FS Visual Quality Objectives for the Thunder Basin National Grassland. Adverse visual impacts would be minimized through careful location of facilities, minimal disturbance of affected sites, and design of facilities so that they harmonize with the surrounding landscape.
- Use of two-track and existing roads and centralization of gas compression facilities along existing roads will minimize the visual impact of the road network.
- The use of buried power lines to each well, where feasible will reduce the linear element in the landscape.
- Construction debris will be removed immediately, as it creates undesirable textured contrasts with the landscape.
- Resource protection measures proposed for erosion control, road construction, rehabilitation and revegetation, and wildlife protection will be implemented during the approval of APDs and Sundry Notices. These measures also would mitigate impacts to visual quality.

Noise

- Compressors should be located at least 600 feet from sensitive receptors (residences, schools, medical facilities, and recreation areas). Under current Wyoming law, the WDEQ can only require this mitigation to occur if municipal or county land use plans address siting of noise emitters.

APPEAL

This decision approving Alternative 1 of the Wyodak CBM Project EIS may be appealed to the Interior Board of Land Appeals, Office of the Secretary, in accordance with the regulations contained in Title 43, Code of Federal Regulations, Subpart 3165.4. If an appeal is filed, your notice of appeal must be filed in this office (Bureau of Land Management, State Director, P.O. Box 1828, Cheyenne, Wyoming 82003) within thirty (30) days from the date BLM publishes its Notice of Availability of this Record of Decision in the *Federal Register*. BLM expects that notice will be published during the week of November 22, 1999. The appellant has the burden of showing that the decision appealed from is in error.

If you wish to file a petition (pursuant to regulation 43 CFR 3165.4(c) for a stay (suspension) of the effectiveness of this decision during the time that your appeal is being reviewed by the Board, the petition for a stay must accompany your notice of appeal. A petition for a stay is required to show sufficient justification based on the standards listed in 43 CFR 3165.4(c). Copies of the notice of appeal and petition for a stay must also be submitted to the Interior Board of Land Appeals and to the Regional Solicitor, Rocky Mountain Region, at the same time the original documents are filed with this office. If you request a stay, you have the burden of proof to demonstrate that a stay should be granted.



State Director



Date

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- WOGCC. 1998. Wyoming Oil and Gas Conservation Commission's Rules and Regulations, Including Rules of Practice and Procedure (Revised). WOGCC, Casper, WY.
- WOGCC, 1999a. Personal Communication, Rick Marvel (WOGCC) regarding "Wyodak EIS Area", Coal Bed Methane Production Statistics, July 26, 1999.
- WOGCC, 1999b. Personal Communication Regarding CBM APD and Drilling Statistics in the Wyodak EIS Area, November 1999.

APPENDIX A
STANDARD “CONDITIONS OF APPROVAL” FOR APDs,
BLM-BUFFALO FIELD OFFICE

STANDARD “CONDITIONS OF APPROVAL” FOR APDS

BLM - Buffalo Field Office

Mitigating measures (i.e., stipulations), in the form of “Conditions of Approval”, are applied to both APD and Sundry Notice Drilling Plans & Surface Use Plans when: 1) they are not specifically addressed in those plans, and; 2) they are needed to mitigate impacts to resource values identified at the onsite inspection or during review of the plans. The first section identifies standard mitigating measures applicable to development involving only coal bed methane. The second section identifies standard mitigating measures that are pertinent to all federal oil & gas lease development. Not all of the mitigating measures in this second section are applicable to coal bed methane development.

It is important to note that site-specific stipulations also are developed by the BLM authorized officer, as needed, on a case-by-case basis at the onsite inspection to address special, unanticipated issues not addressed by a standard mitigating measure (e.g., erosive soils, steep slopes, special wildlife habitats or other special wildlife mitigation measures, proximity to existing improvements, etc.) These special mitigating measures obviously cannot be listed here. The following are the standard mitigating measures that are always applied (if not already specifically addressed in the plans).

Section 1 - APPLICABLE TO COAL BED METHANE WELL DEVELOPMENT ONLY

1. The operator is committed to **all** mitigation measures and monitoring contained in the **(Depends on area)** EA/EIS.
2. The lessee/operator shall provide a comprehensive *water management plan* as part of the Project Plan of Development that addresses how produced water will be handled during the testing and production of well(s). Adequate information should be available to develop this plan before wells are drilled.

For exploratory wells in areas of unknown, untested production potential, the operator will need a temporary (drilling and testing) water management plan. If the well(s) prove to be productive, the operator will then need to submit a permanent water management plan via a Sundry Notice for BLM approval prior to producing the well(s).

Requirements for temporary and permanent water management plans are listed separately below:

Temporary Water Management Plan

Items to be addressed in the Temporary Water Management plan include the following:

Must include a USGS topographic map (1:24000) (or legible copy) showing the actual discharge points, well locations, access routes, and surface pipeline routes.

Temporary discharge points must not be located on hill tops or upland areas. They must be located in existing low-gradient channels (below any active or potentially active head cuts). Or, water can be discharged to existing impoundments of adequate size to store all the test water or designed to pass the discharge water (outlet pipes or reinforced spillways).

Water energy dissipation measures must be designed and utilized at discharge points and along any unstable downstream sections (minor head cuts, eroding channel sections, etc.).

Only surface piping will be authorized for temporary discharge, no trenching will be allowed.

Temporary discharge will be allowed only until the wells have been properly tested to prove production.

Prior to any discharge of water, a standard water quality analysis (barium, iron, manganese, radium-226, chlorides, sulfates, pH, TDS, TPH, and any other parameters, as required by WDEQ) from each well or from representative wells (completed in each zone of production) must be submitted to BLM.

Prior to any discharge of water, all applicable permits and authorizations (such as WDEQ, WSEO, or COE) must be obtained.

Permanent Water Management Plan

Items to be addressed in the Permanent Water Management plan include the following:

Must include a USGS topographic map (1:24000) (or legible copy) showing location of the actual discharge points, wells, access routes, pipeline routes, erosion control and stabilization measures, and impoundments (reservoirs).

Discharge points must not be located on hill tops or upland areas. They must be located in existing low-gradient channels (below any active or potentially active head cuts). Cumulative discharge must not exceed the naturally occurring, mean annual peak flow of the receiving channel. Water can be discharged to existing impoundments that are designed (outlet pipes or reinforced spillways) to pass the proposed discharge water, the naturally occurring mean annual flow, and any existing discharge water.

Plan for, and design of, erosion control and stabilization measures must be shown. Any in-channel measures must be designed to accommodate existing and proposed discharges in addition to naturally occurring flow.

Any new impoundments or enhancement of existing structures must be properly permitted with the WSEO and/or the COE and designed with outlet works to pass all “existing, planned, and potential discharge water” in addition to naturally occurring mean annual flow. In addition, the combination of flood storage (the volume of storage above the outlet works and below the spillway) and spillway capacity must be adequate to accommodate a specific design flood as required by the WSEO. The required design depends on the size of the impoundment (25-year, 6-hour storm event, or 100 year, 24-hour storm event). Flood storage alone must be adequate to contain lesser events. If passage of water through the spillway is to be frequent, the spillway must be reinforced and designed for continual flow (no regular flows on earthen spillways). The outlet works must also be designed in such a manner as not to affect any existing downstream water rights.

The “existing, planned and potential discharge water” can be roughly calculated by determining the watershed area, dividing by the minimum well spacing (currently 40 acres), and multiplying this by the average discharge rate. As is obvious, it is undesirable to put impoundments on the main stem of a large drainage.

Water production rates (for each discharge point) must be disclosed including discharge schedule (initial, intermediate, and final rates and duration) and maximum, mean, and minimum anticipated rates.

A standard water quality analysis (barium, iron, manganese, radium-226, chlorides, sulfates, pH, TDS, TPH, and any other parameters, as required by WDEQ) from each well or from representative wells (completed in each zone of production) must be submitted to BLM.

Prior to any discharge of water all applicable permits and authorizations (such as WDEQ, WSEO, or COE) must be obtained.

A hydrologic watershed analysis, based on field reconnaissance, must be done that includes the following:

- Watershed area
- Average watershed slope
- Existing channel (average slope, width, depth, condition, etc.)
- Calculation of mean annual runoff
- Peak flow analysis (annual, 10, and 25 year return interval at a minimum)
- Destination (i.e. tributary to the Belle Fourche River)

Description of the existing watershed including:

Existing wells (location, depth, water level, use, condition)
Existing impoundments (location, size, volume, use, condition, description of outlet works and spillway)
Road crossings (crossing type - culvert size, low water crossing, bridge, etc. and condition)
Water related uses (i.e. flood irrigated/sub- irrigated crops, livestock, etc.)
Potential downstream concerns (i.e. channel impoundments, hay meadows, coal mine reclamation or sediment structures, unimproved channel crossings, etc.) and plans to mitigate impacts.

Monitoring Plans, which must include as a minimum:

Discharge point(s)- will be monitored on a monthly basis during the first year of operation. Inspectors will note the condition of each discharge point, check for evidence of erosion, and schedule any remedial work if required.
Dam outlets (spillways and pipes) & culvert outlets- will be checked quarterly, or after major storm events during the first year of operation. Inspectors will note the condition of the discharge point, check for evidence of erosion, and schedule any remedial work if required.
Erosion stabilization measures (headcuts, etc.)- will be inspected for signs of erosion or structure failure. Inspectors will note condition and schedule any remedial work if required.
Downstream channel (below the well(s)/project)- will be inspected for signs of accelerated erosion due to the continuous flow of produced water.
After the first year of operation, inspections will only occur annually, unless specific sites have required remedial action. Inspections also will monitor stream channel crossings, culverts, low water crossings, bridges, etc. within and below the project.

If information is not known and cannot be accurately presented, the permanent water management plan needs to be submitted in a subsequent Sundry Notice once the productive capability of the well has been determined.

3. The operator shall submit a **Sundry Notice** for approval **prior to construction** of new surface disturbing activities on lease (e.g., gas & water pipelines, power lines, metering house, access roads and other facilities).
4. The road will be maintained in an undisturbed, 2-track status, as long as year-round, environmentally-sound access can be achieved. The operator shall be responsible for limiting access of field personnel to times when rutting and other resource impacts don't occur. The operator will be responsible for performing any remediation and/or necessary road upgrading (e.g., elevating, surfacing, culverts, low-water crossings, water-wings, etc.) as directed by the BLM authorized officer, resulting from untimely access. In this case, the operator may be required to conduct a Class III Cultural Inventory, if not already done, on upgrade areas **prior to work being performed**.

5. After drilling and construction of production facilities, and at time of final abandonment, all disturbed areas (including pipelines and access roads) will be drill seeded with the seed mixture shown below, unless a different seed mix is provided by the surface owner. Rates given are in pounds of Pure Live Seed (PLS) per Acre. The operator will provide copies of the seed tags to the authorized officer, if requested.

<u>Species-Cultivar</u>	<u>lbs PLS/Acre</u>
(determined at the site-specific onsite inspection)	

6. If in the process of air drilling a well there is a need to utilize mud, all circulating fluids will be contained either in a small temporary mud pit or in an above-ground containment tank. The pit or containment tank will be of a large enough capacity to safely contain all expected fluids without danger of overflow. Fluids and cuttings will not be squeezed out of the pit, and the pit will be reclaimed in an expedient manner per the above requirements.
7. Vegetation control by mowing or cutting is authorized on the access road and around the well and production facilities to minimize fire hazard and allow safe, environmentally-sound, year-round access. No vegetation or soil blading is authorized.
8. CBM well APDs will not be approved unless the operator provides certification that a water well agreement has been offered as explained in number (12) of the Surface Use Plan.
9. An APD is not considered complete until a Class III cultural resource survey has been performed and a report is submitted to BLM. BLM's consultation with the State Historic Preservation Office is mandatory and can take up to 30 days.

Section 2 - PERTINENT TO ALL OIL & GAS WELL DEVELOPMENT

Note: Not all of the mitigating measures in this section are applicable to coal bed methane development.

DURING CONSTRUCTION

1. Remove all available topsoil (estimated average depth of _____ inches, **determined site-specifically during the onsite inspection**) from the location, including areas of cut, fill, and/or spoil storage areas, and stockpile at the site. Clearly segregate topsoil from excess spoil material. Any topsoil stockpiled for one year or longer will be signed and stabilized with vegetation. Seed with annual ryegrass or other suitable cover crop.
2. The operator will not push soil material and overburden over side slopes or into drainages. All soil material disturbed will be placed in an area where it can be retrieved and where it doesn't impede watershed and drainage flows.
3. Construct the backslope no steeper than 1.5:1. Construct the foreslope no steeper than 2:1.

4. Maintain a minimum 20' undisturbed vegetative border between the toe of fill of pad and/or pit areas and the edge of adjacent drainages.
5. Prior to beginning construction or drilling operations, the operator shall upgrade the proposed access road to BLM standards (including topsoiling, crowning, ditching, drainage culverts, surfacing, etc.) to ensure safe, environmentally-sound, year-round access.
6. A flare pit will be constructed on the well pad for use during drilling operations. It will be located at least 125-feet from the well head and will be located down-wind from the prevailing winds.
7. The reserve pit will be oriented to prevent collection of surface runoff. After the drilling rig is removed, the operator may need to construct a trench on the uphill side of the reserve pit to divert surface drainage around it. If constructed, the trench will be left intact until the pit is closed.
8. The reserve pit will be lined with an impermeable liner if permeable subsurface material is encountered. An impermeable liner is any liner having a permeability less than 10^{-7} cm/sec. The liner will be installed so that it will not leak and will be chemically compatible with all substances which may be put in the pit. Liners made of any man-made synthetic material will be of sufficient strength and thickness to withstand normal installation and pit use.
9. If any cultural values (sites, artifacts, remains) are observed during operation of this lease/permit/right-of-way, they will be left intact and the Buffalo Field Manager notified. The authorized officer will conduct an evaluation of the cultural values to establish appropriate mitigation, salvage or treatment.
10. If paleontological resources, either large and conspicuous, and/or a significant scientific value are discovered during construction, the find will be reported to the authorized officer immediately. Construction will be suspended within 250 feet of said find. An evaluation of the paleontological discovery will be made by a BLM-approved professional paleontologist within five (5) working days, weather permitting, to determine the appropriate action(s) needed to prevent the potential loss of any significant paleontological values. Operations within 250 feet of such a discovery will not be resumed until written authorization to proceed is issued by the authorized officer. The applicant will bear the cost of any required paleontological appraisals, surface collection of fossils, or salvage of any large conspicuous fossils of significant scientific interest discovered during the operation.

DURING OPERATIONS

1. Confine all equipment and vehicles to the access road, pad, and area specified in the APD.
2. All trash will be contained in a trash cage. Upon completion of the drilling operation, the trash cage will be removed and the trash disposed of at an authorized disposal site. No trash or empty barrels will be placed in the reserve pit or buried on location.

3. Fence the reserve pit on three (3) sides during drilling and on the fourth side at the time the rig is removed.
4. Sewage shall be placed in a self-contained, chemically treated porta-potty on location.
5. Rat and mouse holes shall be filled and compacted, from the bottom to the top, immediately upon release of the drilling rig from the location.
6. Produced hydrocarbons shall be put in test tanks on location during completion work. Produced water will be put in the reserve pit during completion work, per Onshore Order #7.
7. Cuttings and drilling fluids shall be put in the reserve pit during drilling.
8. The operator and their contractors shall ensure that all use, production, storage, transport and disposal of hazardous and extremely hazardous materials associated with the drilling, completion and production of this well will be in accordance with all applicable existing or hereafter promulgated federal, state and local government rules, regulations and guidelines. All project-related activities involving hazardous materials will be conducted in a manner that minimizes potential environmental impacts. A file will be maintained containing current Material Safety Data Sheets (MSDS) for all chemicals, compounds and/or substances which are used in the course of construction, drilling, completion and production operations.
9. The only fluids/waste materials which are authorized to go into the reserve pit are RCRA-exempt oil and gas exploration and production wastes. Any evidence of non-exempt wastes being put into the reserve pit may result in the BLM authorized officer requiring specific testing and closure requirements.

RCRA-exempt oil and gas exploration and production wastes include:

drilling muds & cuttings
rigwash
excess cement and certain completion or stimulation fluids defined by EPA as exempt

It does not include drilling rig waste, such as:

spent hydraulic fluids
used engine oil
used oil filter
empty cement, drilling mud, or other product sacks
empty paint, pipe dope, chemical or other product containers
excess chemicals or chemical rinsate

IF THE WELL IS A DRY HOLE

1. During reclamation of the site, the operator will push fill material back into the cuts and up over the backslope to approximate the original topography. No depressions will be left that trap water or form ponds.
2. The fluids and mud must be dry in the reserve pit before the pit area is recontoured. The operator will be responsible for recontouring any subsidence areas that develop as a result of closing a pit before it is completely dry. The plastic pit liner will be cut off below grade and properly disposed of before beginning to recontour the site.
3. Before the location has been reshaped and prior to redistributing the topsoil, the operator will rip or scarify the drilling platform and access road, on the contour, to a depth of at least 12 inches. The rippers are to be no farther than 24 inches apart.
4. Distribute the topsoil evenly over the entire location and prepare the seedbed by disking to a depth of 4-to-6 inches, following the contour.
5. Water bars are to be constructed at least one (1) foot deep, on the contour, with approximately two (2) feet of drop per 100 feet of water bar, to ensure drainage. Water bars are to be extended into established vegetation. All water bars are to be constructed with the berm on the downhill side of the water bar, to prevent soft material from silting in the trench. The initial water bars should be constructed at the top of the backslope. Subsequent water bars should follow the following general spacing guidelines:

<u>% Slope</u>	<u>Spacing Interval (feet)</u>
2 or <	200
2 - 4	100
4 - 5	75
5 or >	50

6. The operator will drill seed on the contour to a depth of 0.5 inch, followed by cultipaction to compact the seedbed and prevent soil and seed losses. To maintain quality and purity, certified seed with a minimum germination rate of 80% and a minimum purity of 90% will be used. When a different seed mix desired by the surface owner is not provided, use the following:

<u>Species-Cultivar</u>	<u>lbs PLS/Acre</u>
(determined at the site-specific onsite inspection)	

7. If slopes too steep for machinery to operate, twice the specified amount of seed may be broadcast and raked by hand.
8. Complete fall seeding after September 15 and prior to ground frost. To be effective, complete spring seeding after the frost has left the ground and prior to May 15.
9. The operator will control noxious weeds on the location and along the access road. On BLM-administered surface, this will require authorization in a pesticide use permit.

10. The operator will reshape abandoned access roads by pushing fill material back into the cuts. On roads to be permanently closed, water bars shall be constructed near the contour across the shaped road, utilizing the spacing guidelines contained in No. 5 above.
11. Disc and seed the access road as per No. 6 above.
12. All rehabilitation work, including seeding, will be completed as soon as feasible following plugging.
13. Following seeding, the location will be temporarily fenced off (**if not already fenced**) for at least two complete growing seasons, to ensure long-term reclamation success, unless otherwise requested by the surface owner.
14. BLM will not release the performance bond until the area has been successfully revegetated (evaluation will be made after the second growing season) and has met all other reclamation goals of the surface owner and surface management agency.
15. A Notice of Intent to Abandon and a Subsequent Report of Abandonment must be submitted for abandonment approval.

IF THE WELL IS A PRODUCER

1. The entire location will be fenced off with a 4-strand barbed wire fence, containing H-braces on the corners and a cattleguard, located far enough outside disturbed areas and soil stockpiles to allow for perimeter rehabilitation within the fenced location, unless otherwise requested by the surface owner.
2. Landscape those areas not required for production to the surrounding topography as soon as possible. The fluids and mud must be dry in the reserve pit before recontouring the pit area. The operator will be responsible for recontouring any subsidence areas that develop as a result of closing a pit before it is completely dry.
3. Reduce the backslope to 2½:1 and the foreslope to 3:1. Reduce slopes by pulling fill material up from foreslope into the base of cut slopes.
4. Production facilities (including dikes) must be placed on the cut portion of the location and a minimum of 15 feet from the base of the back cut.
5. A dike will be constructed completely around the production facilities (i.e. production tanks, water tanks, and heater-treater). The dikes for the production facilities must be constructed of **impermeable** soil, able to hold the capacity of the largest tank plus 2-feet of freeboard, and be independent of the back cut.
6. Any chemicals used in treating the wells (e.g., corrosion inhibitor, emulsion breaker, etc.) will be held in a secure, fenced-in area that has a secondary containment structure (dikes, catchment pan, etc.)

7. The load-out line coming from the oil/condensate tank(s) will have a suitable containment structure to capture and recycle any oil spillage that might occur.
8. Individual production facilities (tanks, treaters, etc.) will be fenced-off (**if entire facility not already fenced-off**).
9. Distribute conserved topsoil (from stockpile) evenly over those areas not required for production and seed as recommended. ****Due to fragile soils, the entire well location may need to be fenced-off to ensure revegetation success and the stability of the reclaimed location perimeter throughout the producing life of the well, subject to the discretion of the BLM authorized officer.****
10. All permanent above-the-ground structures, tank batteries, etc., that will remain longer than six months will be painted desert brown (Munsell standard color No. _____, **to be determined at onsite**). An exception will be made where special safety colors are required under Wyoming Occupation Health and Safety Act Rules and Regulations.
11. Upgrade and maintain access roads and drainage control (e.g., culverts, drainage dips, ditching, crowning, surfacing, etc.), as necessary, and as directed by the BLM authorized officer, to prevent soil erosion and accommodate safe, year-round traffic.
12. Prior to construction of production facilities not specifically addressed in the APD, the operator shall submit a Sundry Notice to the BLM authorized officer for approval.
13. If not already required prior to constructing and drilling the well location, the operator shall immediately upgrade the entire access road to BLM standards (including topsoiling, crowning, ditching, drainage culverts, surfacing, etc.) to ensure safe, environmentally-sound, year-round access.

PIPELINES AND FLOWLINES

1. Prior to construction, any pipelines/flowlines located off the disturbed well pad must be authorized by the BLM under a Sundry Notice.
2. Graders shall be used whenever possible to construct or to clear the pipeline right-of-way. The cleared right-of-way shall not be more than fifteen (15) feet wide (preferably three (3) feet wide on the soil stockpile side, and twelve (12) feet wide on the working side of the trench) without prior approval of the authorized officer. Bladed materials shall be placed back into the cleared route once construction is completed.
3. Pipeline construction shall not block nor change the natural course of any drainage. Suspended pipelines shall provide adequate clearance for maximum runoff.
4. Pipeline trenches shall be compacted during backfilling. Pipeline trenches shall be maintained in order to correct settlement and erosion.

5. Water bars are to be constructed at least one (1) foot deep, on the contour, with approximately two (2) feet of drop per 100 feet of water bar, to ensure drainage. Water bars are to be extended into established vegetation. All water bars are to be constructed with the berm on the downhill side of the water bar, to prevent soft material from silting in the trench. The initial water bars should be constructed at the top of the backslope.

Subsequent water bars should follow the following general spacing guidelines:

<u>% Slope</u>	<u>Spacing Interval (feet)</u>
2 or <	200
2 - 4	100
4 - 5	75
5 or >	50

6. All disturbed areas associated with well drilling and associated facilities (pipelines, access roads, etc.) will be seeded during the first fall following construction. The operator will drill seed on the contour to a depth of 0.5 inch, followed by cultipaction to compact the seedbed, and prevent soil and seed losses. To maintain quality and purity, certified seed with a minimum germination rate of 80% and a minimum purity of 90% will be used. When a different seed mix desired by the landowner is not provided, use the following:

<u>Species-Cultivar</u>	<u>lbs PLS/Acre</u>
(determined at the site-specific onsite inspection)	

7. If slopes are too steep for machinery to operate, twice the specified amount of seed may be broadcast and raked by hand.
8. Complete fall seeding after September 15 and prior to ground frost. To be effective, complete spring seeding after the frost has left the ground and prior to May 15.
9. The operator will be responsible for control of noxious weeds along the pipeline right-of-way. On BLM-administered surface, this will require an authorized pesticide use permit prior to spraying of any commercial herbicides.